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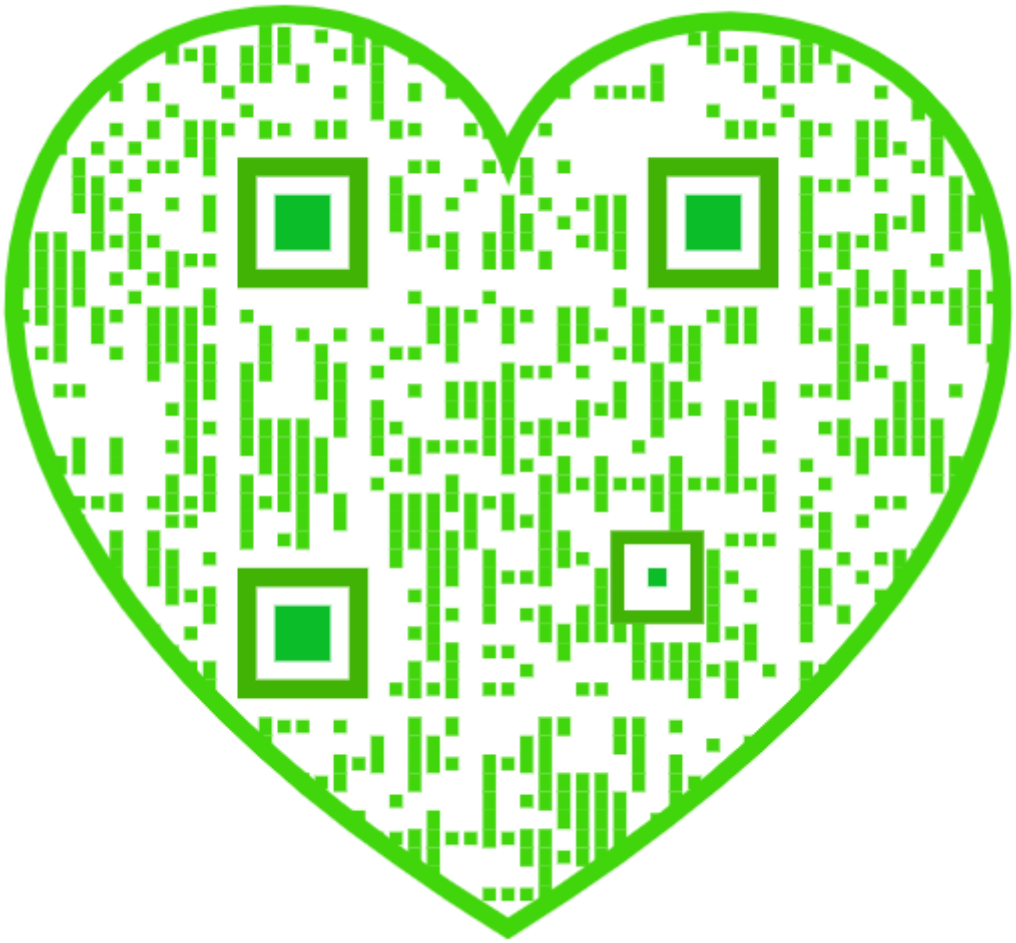

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WAITING FOR SOMETHING TO TURN UP.

He had formerly been a printer, he said to the Congressional Labor Committee; but for the past two years he had been "one of the unfortunates who had been obliged to wait for something to turn up." His name was W. Godwin Moody, of Boston; and while waiting for something to turn up he had—like so many idle men—solved the labor problem—to his own satisfaction. When the Committee asked him a plain question or two, however, calling for facts instead of confident assertions, Mr. Moody got sadly mixed up, the reporters said, and "floundered into all sorts of ridiculous assertions, theories, statements, and vagaries, highly amusing to listeners." Of one thing he appeared to be very sure, namely, that he was one of some 3,780,000 men in the United States, unemployed and waiting for something to turn up. Seeing that even Kearney's number is nearly a million less than this, there is reason to believe that Mr. Moody's statistics are not wholly to be depended on, especially as the results of the recent labor census of Massachusetts conclusively prove that Mr. Kearney overstates the number of the unemployed at least ten to one. But let that pass: the fact remains that there are a good many people to-day in Mr. Moody's situation, idle and waiting for something to turn up. The proportion of the idle (willing or unwilling) to the employed is probably not much if any greater than obtains during the most prosperous times; still the aggregate for the whole country must be considerable. Whose fault is it? and how is the difficulty to be remedied?

We fear that many of them, a very large proportion indeed, are like Mr. Moody, idle because they prefer to spend their energies in denouncing capital and machinery, while waiting for something to turn up, rather than buckle-to and help to make something turn up. Things do not turn up very well of themselves; and in the busiest times the men who have not force enough to make occupation for themselves are little likely to have employment thrust upon them, except under conditions neither enjoyable nor personally profitable. Mr. Moody was formerly a printer. What hinders his being a printer now? If we mistake not the demand for printers is as great as it ever was. With but few exceptions the same is true of every sort of labor. Where the aggregate amount of labor called for in a particular field has been largely and permanently diminished, as in the case of iron makers by the substitution of steel for iron in the arts, the only thing for the displaced workmen to do is to try something else. To fold their hands and wait for something to turn up is to invite starvation.

It used to be the boast of American workmen that so long as they had health and hands they were practically independent. If one calling failed they could turn to something else. If no man wanted to hire them they could be their own bosses, and at least make an honest living while waiting for the occupation they preferred to come around again. Such is the industrial condition of the great majority of American artisans now; and these men are not without something to do. The small minority that choose to wait in idleness for something to turn up, but take pains not to assist in turning up anything, are very apt to be in Mr. Moody's condition—and deserve to be.

In times of severe commercial depression and consequent industrial distress, such as recently prevailed among us, many thrifty and industrious people are thrown out of work by no fault of their own; but they do not helplessly wait, year after year, for something to turn up. They bestir themselves, do what they can, and rarely have to wait long for remunerative employment. The minority, who will do one thing or nothing, and rather prefer the latter, are apt to make a great hullabaloo about their personal grievances and the hardness of the times; but they do not distinguish themselves by practical or strenuous effort in the way of productive industry. The times are bad for them, chronically bad, always, however busy their neighbors may be; and the thrift and prosperity of others only make their case seem all the worse in their own estimation. They will not see that their misfortune arises oftener and more largely from causes purely personal—incompetence, intemperance, lack of force, or lack of integrity and moral worth—than from hard times or an insufficient demand for labor that is worth hiring. With the utmost sympathy for the unfortunate, we have none whatever for self-made misery; still less for those who quarrel with the natural order of things, demanding that the government shall overturn society for their exclusive benefit.

CHARITABLE COLONIZING.

It has frequently been urged in the Congressional Labor Committee and in the public journals that Congress might do much toward equalizing the distribution of labor by gathering up the unemployed and putting them upon new lands in the West. Indeed, the idea of colonizing the idle is a favorite one with many theoretical philanthropists. They forget, however, the essential fact that a successful colonist must be a man of more than average resolution, patience, and ability. He must be willing to work long and hard, to endure pluckily many privations, in the hope of future reward; and often he must expect the reward to come not to himself, but to his family after he is dead. He must withal be able to stand on his own feet; to hew his own way in the world; and be willing to be deprived of society and social props.

The idler, in city or town, is very apt to lack each and all of these qualifications. Most likely he is idle because he falls far below the average in self-reliance, capacity, energy, and thrift. Put such a man on the best piece of land in the world, away from society, and he would either run away or starve. Men of that stamp are not the stuff out of which successful colonists are made. As Mr. Henchman somewhat roughly put it: "Those who would suffer themselves to be transported free to the public lands would not be worth the freight."

VALUE OF OBSERVATION IN INVENTION.

It is said the world over that "necessity is the mother of invention," but the fact is that only a small proportion of the patented inventions of the day have been called forth by sheer necessity. The multitude of inventions made in this country may be attributed chiefly to the great desire of Americans to acquire wealth.

While some men invent because they perceive and appreciate a need therefor, others in a laborious way study and experiment almost without special aim, having a desire to do something, without knowing whither to direct their thoughts. It is not so difficult often to devise means for accomplishing a known object as to discover that the thing needs to be done. It thus appears that a vital point with the inventor is to see where chances for improvement lie. Close and well directed observation only can reveal these opportunities.

It may be said that to follow any line of investigation requires a special knowledge of that particular line, and that it is impossible for any person to have a comprehensive knowledge of everything; but the history of invention shows that many important improvements have been made by persons unfamiliar with the art to which the inventions pertain. This is accounted for by the singular blindness of most men to the defects of things with which they are best acquainted.

A systematic inspection of every device, whether new or old, therefore, with a view to the discovery of possible chances for improvement, and a close observation of methods of doing things in the various branches of manufacture, and in every day life in the household, are, generally speaking, a sure means of opening the avenues that lead to success. Nothing should escape the notice of the inventor. He should train himself to observe, weigh, and consider everything that comes under his notice, and thus acquire habits of observation which are of more value than capital.

It is not essential to the success of an invention that it should be better than others of its class, nor is it always requisite that it should be less expensive. If the new device is equally as good as the old, costs no more, and accomplishes its object in a different way, it will with proper management command a place in the market. It is therefore in the province of the inventor not only to develop things entirely new, but to try to accomplish known results by new means. The success of an inventor in doing these things depends to a great extent on his power of observation.

SPECULATIVE MINING.

It would seem but natural to suppose that the recent years of commercial distress and shrinkage of all property values would have taught every one having money left to invest to discriminate between shadows and substance, but it is plainly evident that such is not the case in every instance.

How much probable substance is there, for example, in the twelve mining companies which, we learn by our exchanges, have organized in California and contiguous States during the past six weeks, with stock capitals of $10,000,000 each, an aggregate of $120,000,000?

How much of this represents substance and how much the thinnest shadow?

If we were to allow $1,000,000 for the purchase value of each mine (assuming the property to be exceptionally valuable) and the machinery and labor requisite for its development to the point where its revenues would (if ever) exceed its expenses, we should be considered liberal in the extreme; as rarely, or never, has a mine been properly worked whose "true inwardness" has not been arrived at or understood with an expenditure of half this amount. Of what use, then, is the remaining $108,000,000 of stock, unless it is to be philanthropically distributed among "outsiders," at ten cents on the dollar, to give them opportunities for practical knowledge of assessments?

The passion for gambling, which in some measure is inherent in all men, is shrewdly understood and taken advantage of by exploiters of affairs like these, and hence they offer the alluring bait of ten chances for a dollar with very reasonable hopes of success, and count, by the manipulation of stocks and levying of assessments, to close the game in due course of time, with stock, dividends, and mines all under their control.

So often and successfully has this game been played that one almost ceases to pity the willing victims, whose folly renders the success of such impositions possible.

These relics of the old times must be utterly repudiated by all those who are interested in the legitimate development of our mining interests; and the sooner they are struck out of existence the sooner will mining enterprises in general win their deserved position in the estimation of the public.

Speculation increases at the San Francisco Mining Exchange, and fortunes are reported to have been suddenly made by the rise in Ophir, Bodie, Grand Prize, Mexican, Union Consolidated, and others. The Bodie, which has but recently attracted attention, is in Mono county, California, and a recent shipment of $134,000 from it, as the result of a ten days'

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run, put up its stock from $1.50 to $25 per share, and infused new life throughout the district, important developments in a large number of other mines there being immediately thereafter reported, and their stocks consequently largely advancing at the San Francisco Mining Board.

The stock of the Sierra Nevada Mine, of the Comstock Lode, has advanced from about $5 to nearly $35 within a few weeks because of the reported discovery of a bonanza on the 2,100 foot level. The mine embraces 3,300 feet of the lode, and is of a group of thirteen mines controlled by Flood, Fair & McKay, which together absorb 13,478 feet of the Comstock Lode. It was stocked some years since at $10,000,000, and has paid $102,500 in dividends, while it has called in $2,100,000 in fifty-five assessments. Four or five months since its stock sold as low as $2.60.

The Virginia City *Enterprise* says: "The strike in the Sierra Nevada has been made at a depth that corresponds to the 2,200 foot levels of several of the leading mines at this end of the lode, and therefore shows that depth is no hindrance to the formation of bonanzas. This being the case, all are turning with new interest to the many mines in which they are now about ready to cross-cut at depths ranging from 1,800 to 2,400 feet. Never before have so many mines along the entire length of the Comstock been ready, at about the same time, to do deep and promising prospecting. The result of what many mining companies have been working years to attain is now soon to be seen. The Belcher and Crown Point companies have at last arrived at a point which it has cost the labor of several years and the expenditure of vast sums of money to reach; and to the northward are the Yellow Jacket and Imperial, with the Alpha and a whole group of mines that are now about ripe for the work of thorough exploration.

"The Savage and Hale and Norcross are being prospected at the depth of 2,100 feet, the Julia at 2,000, and the Gould and Curry and Best and Belcher at the depth of 1,950 feet. The Ophir Company— whatever they may have on the 2,000 level —will soon reach their ore body at a depth of 2,100 feet.

"Through this mine and the Sierra Nevada the Mexican and Union Consolidated mines may readily be tapped at the depth of 2,100 feet. At the south end of the lode the Overman, Caledonia, Lady Washington, New York, Alta, and Justice are all in a position to do good work at prospecting."

The Sutro Tunnel effected communication with the Comstock Lode at the 1,650 foot level of the Savage Mine, and shortly all the mines at this end will be in communication with it. Even if no bonanzas are struck in them their low grade and rejected ores can then be worked at a profit.

THE AMERICAN ASSOCIATION AT ST. LOUIS.

The Annual Convention of the American Association for the Advancement of Science, held in St. Louis, Mo., August 21–27, attracted less popular attention than usual, yet was on the whole a very successful and satisfactory meeting. The terrible pestilence raging in the lower Mississippi valley made such demands upon public interest and sympathy that the claims of pure science were for the time overshadowed. The health of the city, however, was fortunately good, and the welcome accorded to the assembled scientists by the citizens of St. Louis was all that could have been desired.

A notable feature of the meeting was the prevalent spirit manifested in favor of the dissemination of scientific knowledge in popular form, by lectures, by means of the press, and by direct scientific teaching in the public schools. The cordial recognition of the importance and value of the labors of practical investigators, as represented by Mr. Edison, was another striking feature. As Professor Barker observed on introducing Mr. Edison, "the time has come when scientists can no longer claim to be the only discoverers; the practical man has found science too slow, and has stepped in and discovered for himself." Seeing how cordially the scientists had received the practical man into their ranks during the eclipse observations, it is impossible to attribute their tardy recognition of his merits (as might otherwise have happened) to the dispatch received that morning announcing that the Paris Exposition had awarded Mr. Edison the grand prize for the most wonderful inventions of the age.

From the press dispatches we compile the following summary of the more important work done day by day.

August 21.—The Association met at the Washington University. Prof. Newcomb, the retiring president, called the meeting to order, and introduced Prof. O. C. Marsh, the president for the ensuing year, who made a brief address. Wm. T. Harris, of the local committee, then introduced Mayor Overstolz, who delivered an address of welcome in behalf of the citizens of St. Louis. An appropriate response was made by Professor Marsh. Six new members were elected, and the names of thirty candidates for membership were presented. The Association then adjourned till night, to give the members of the different sections an opportunity to organize, which was done in the afternoon. In the evening addresses were delivered by Vice Presidents Thurston and Grote. The subject of the former was "Philosophical Methods of Advancement of Science" and of the latter, "Education a Succession of Experiences."

August 22.—The report of the committee to memorialize the State Legislatures regarding the cultivation of timber and preservation of forests was read and adopted. After some other miscellaneous business the meeting adjourned and met in sections. Papers on chemistry and physics were read in Section A, by Messrs. Osborne, Thurston, and Clarke; papers on anthropology were read in Section B, by Messrs. Morgan, Henderson, and Bandelier, and papers on Entomology by Professor Riley. The event of the evening was the address of the retiring president, Professor Newcomb, on the two modes of explaining nature and the progress of men from teleological to scientific thinking.

August 23.—The committee appointed to memorialize Congress in relation to meteorological researches reported through Professor Bolton, who proposed that the committee be continued; that Mr. Osborne, of Washington, be added to the committee, and that Professor Loomis be requested to take the chair. A number of new members were introduced, among them Mr. Edison, who afterward read, in Section A, a paper on "The Use of the Tasimeter for Measuring the Heat of Stars and of the Sun's Corona;" after which Professor Barker read for him three other papers, that on his new voltameter being perhaps the most important. Professor Barker then read a paper on "The Results of the Spectroscopic Observation of the Solar Eclipse of July 29, 1878."

August 26.—In Section A, Professor Cesbaine gave a scheme for making meteorological observations in a tall tower, by which different strata of air could be reached. Professor Barker, in Mr. Edison's absence, discussed Edison's application of the carbon button. The section had time in the afternoon only to hear a paper on the outline of work done by the Fort Worth solar eclipse party by Professor J. K. Rees. In Section B a paper on the embryology of clepsine was read by Professor C. O. Whitman, of Boston. This paper was illustrated by a beautiful set of wax models after original preparations by Professor Whitman. A paper was read by Professor Wetherby on the geographical distribution of the land and fresh water mollusks of the United States. In geology the section listened to a paper by Professor Todd on the theory of the loess deposit in China as put forth by Richthofen. A paper by C. E. Dutton, of Washington, on the geological history of the Colorado plateau, was more graphic and intelligible than such discourses usually are. The anthropologists listened to a paper by Mr. Perkins on the archæology of Vermont, and to the announcement of discoveries of glazed pottery and skulls found in use as cinerary urns in Florida mounds by Henry Gillman. Professor Morse sent a paper from Japan on his discovery in Japanese mounds of pottery suggesting the presence of a pre-Aino population who unlike all historic peoples of the Japan archipelago were cannibals. In chemistry the announcement by Professor J. Lawrence Smith of his discovery of the oxide of a new metal which he calls *mosandrum*, the first elementary substance ever discovered by an American, was of very great scientific interest.

August 27.—The Nominating Committee of the Association decided on Saratoga as the place for the next meeting, and the last Wednesday in August, 1879, as the time. The following officers for the ensuing year were elected: Professor George F. Barker, of Philadelphia, President; Professor S. P. Langley, of Allegheny, and J. W. Powell, of Washington, Vice-Presidents; Dr. Little, of Atlanta, Ga., General Secretary; John K. Rees, of St. Louis, Secretary of Section A; and A. G. Wetherby, of Cincinnati, Secretary of Section B.

At the general session a resolution was passed requesting Congress to pass a law to secure a uniform system of registration of births, deaths, and marriages in the United States. Papers were read by Professor Marsh on the dinosaurs of the Jurassic, and one by Professor Lake on the discovery of their remains in Colorado. Geological papers were read by Professors Safford, Dutton, and Worthen; on anthropology by Professors Putnam, Belt, Marsh, and Mason; on botany by Professors Engleman and Arthur. The Association elected Mr. Thomas A. Edison a Fellow. Papers were read in Section A by Professors Elliott, Nepper, and Powell.

FACADE OF THE DANISH SECTION AT THE PARIS EXHIBITION.

The façade of the Danish section, in the Street of the Nations, is copied from the Bourse at Copenhagen. It is a small building of brick and sculptured white stone, lacking neither elegance nor originality of design. On each side of the entrance rise two stucco columns, imitating marble. Between each pair is a niche, at present empty. The columns nearest the entrance support projecting pilasters, above which are two other columns of lesser proportions, which form a frame for the curious mullioned window of the first floor. The gable is ornamented with two beautiful Caryatides, between which the royal scutcheon is sculptured. A truncated pyramid surrounded by a sphere crowns the pediment. Within, Denmark occupies but one half of the transverse triforium; the right is occupied by Greece, and the piquant contrast between the products of the country and period of Pericles and those of the cold and foggy Baltic Islands is continued through the galleries appertaining to the façade. Throughout, and even in the vestibule of the Danish house, we meet with the Exhibition of the Direction of the Communal Schools of Copenhagen. Education is greatly considered in this kingdom, especially primary instruction, which is gratuitous and compulsory. Upon the little tables used in the schools are shown the productions of the pupils, drawing albums and copy books. A glasscase contains various objects of needle work, cleverly done by little girls. There is, however, nothing relating to the method of secondary instruction, nor to the system adopted in the *lycées* and technical institutions, which are said to be admirably adapted to suit their special needs.

The show cases of the first room contain specimens of printing and Danish book making, ships, rigging, and perfumery. More worthy of note are the beautiful ceramic collections of Madame Ipsen and Peter E. Schon, of Copenhagen. The labels inform us that several of the specimens have been bought by the Vienna Museum. A little further on, a large show case verging upon the longitudinal gallery also attracts notice. Want of space permits us merely to mention the magnificent show of jewelry exhibited by M. Christesen, of Copenhagen; supremely fine are an épergne and two grand chalices. The adjoining room is principally devoted to furniture, for the making of which Copenhagen enjoys a certain reputation, which is certainly justified by the present exhibition. The fine buffet sideboards are the prizes of a lottery formed on behalf of the Institution for Idiots. The center of the hall is in the form of a semicircular rotunda, at the upper part of which is a kind of fresco representing the different types of the country in national costume. Shop keepers, sailors, fishermen, workmen, and peasants follow each other hand in hand, and carrying garlands. Perhaps it is the neighborhood of Greece which has inspired this reminiscence of the Panathenaic procession. On entering the third hall, which is devoted to clothing, the skin of the formidable white bear contrasts in its vividness with the soft shading of the eider down. We take our engraving on the first page from *Illustration*.

AMERICAN PLOWS IN FRANCE.

The official report of the dynamometric trials of French and American gang plows at Petit-Bourg, Department of the Seine and Oise, France, August 6 (intended to accompany the illustrated article on the plows of the Paris Exhibition, by our Paris correspondent, U. S. Commissioner E. H. Knight), arrived too late for insertion in this number of the SCIENTIFIC AMERICAN. It will be given next week.

Meantime we take great pleasure in stating that the well earned fame of American agricultural machinery was well sustained in the contest.

The competing exhibitors were Meixmoron de Dombasle, of Nancy, France, and Deere & Co., of Moline, Illinois. Though somewhat heavier than the French plow, the American plow was of lighter draught, more speedy, and considerably more efficient than its rival. The prescribed furrow was 175 yards long. It took the French plow eight minutes and fifty seconds to go and come, and the American eight minutes and thirty-four seconds. The power required to displace a metric cube of earth was 7 per cent less for the American than for the French plow. The furrow turned by the American plow was deeper by 6 per cent and broader by over 7½ per cent than that of the French plow.

The detailed report will be found of interest to many besides the owners of the champion plow.

American Institute Exhibition.

This exhibition opens on the 11th day of September, by which date all exhibitors should be in position. The incompleteness of all exhibitions is the cause of general and well deserved complaint, yet we hope our frequent notices of this exhibition may have at least the effect of having this one in good shape on opening day. Any parties intending to exhibit should apply at once, and address all communications to General Superintendent, American Institute, New York city.

Prize for an Invention.

Charles Bartlett, United States Consul at Guadaloupe, informs the Department of State that the authorities of that colony have offered a premium of 100,000 francs to the inventor of a process to obtain a yield of over fourteen per centum from sugar-cane. The competition is open until June 30, 1880. It is not for an improvement on sugar mills, but for the discovery of a process bearing upon the yield of turbinated sugar. All the expenses of transit, putting up of machinery or implements are to be borne by the inventor.

Such an invention would add many millions to the wealth of Guadaloupe, to say nothing of Cuba, our own and other sugar producing countries.

Fish Culture in Wisconsin.

Operations will begin at the Milwaukee hatching house in October. It is intended to hatch the coming season 12,000,000 whitefish and 6,000,000 lake trout. Nearly all these fry will be placed in Lake Michigan off the Wisconsin ports. Smaller quantities will go to the inland lakes which are large and deep enough for the purpose. At the hatchery in this city the production of wall-eyed pike will also be begun the coming season. At Madison preparations are made to supply all the brook trout for which requisitions may be made. They have 20,000 breeders in the Madison hatchery, and spawn will also be taken from wild trout in the streams in the northwestern part of the State. Much dissatisfaction has heretofore existed because the brook trout were not furnished in amounts as required to replenish the exhausted streams of the State. The fish commissioners hope to have enough fry next spring to answer all requisitions for these fish.

Mr. Welsher has been appointed to have charge of the aquarium at the Chicago exposition next month, and will produce specimens of fish from Wisconsin waters for that purpose. The fish commissioners have supplied over one hundred lakes and streams during the last two years with several varieties of fish.—*Milwaukee News.*

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PARIS EXHIBITION OF 1878.

OFFICIAL TRIAL OF PLOWS.

The trial of plows at the French Exhibition took place at Petit-Bourg, in the department of the Seine and Oise, about 19 miles from Paris, under the direction of Monsieur

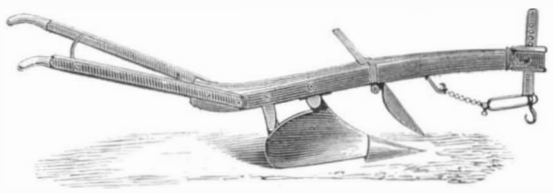

Fig. 1.—FRENCH WOODEN MOULD-BOARD PLOW.

Eugene Tisserand, the Director-General of Agriculture of France, on the 29th of July, 1878. M. Tisserand had charge of the experiments in the field at the Exhibition of 1867, and was Director of the Government farms during the Empire. The trials this year were held on the farm of M. Decauville, an area of several hundred acres being placed at the disposition of the Director, and the American plows were very politely accorded the place of honor in front of the principal tent and Quartier Générale.

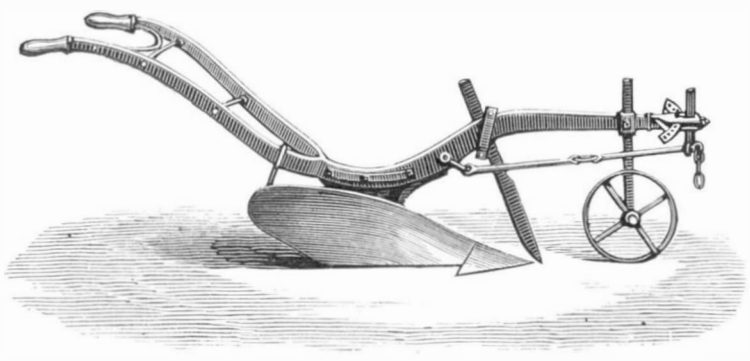

Fig. 2.—FRENCH ONE-WHEEL PLOW.

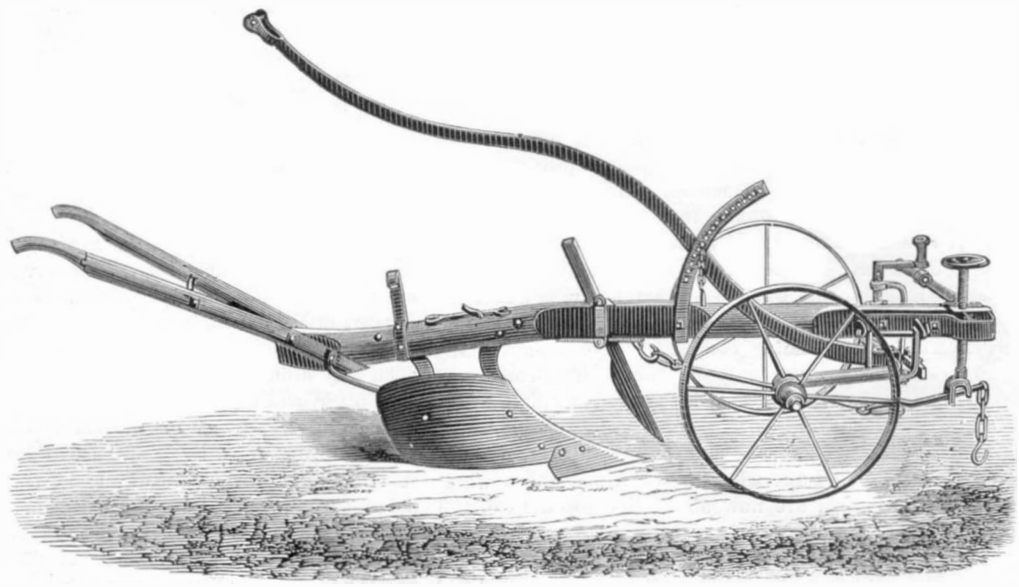

Fig. 3.—DOMBASLE'S TWO-WHEELED PLOW.

Fowler, of Leeds, England, had two sets of steam plows on the field, and Debains, of St. Remy, Département Seine et Oise, had one set. Both did good work, but I do not propose to refer to them at length here. Aveling & Porter's steam plows are to be tried at Gonesse on the 12th proximo.

The plows exhibited were five from America—a gang, sulky, and ordinary plow by Deere & Co., of Moline, Ill.; a plow by Gale, of Albion, Mich., and one by Speer, of Pittsburg, Pa. There were twenty-four French exhibitors, two from Italy, and one from Hungary. Some of the French exhibitors had as many as five plows of different descriptions, and the number in motion at once was about fifty-four. The ground for each was marked off by a furrow, and each was given a field to plow. The farm itself is level and devoid of trees and fences, except the fine avenue on the great Paris and Fontainebleau road, which runs through the tract, and is paved with square blocks, laid perhaps at the time when Francis I. lived in the spacious palace, and it is likely to last in good condition as much longer.

Owing to the land laws of France the soil is now generally owned in small tracts, and in the present instance M. Decauville rents it of nineteen different proprietors, but no signs of demarkation exist. He pays as rent the sum of 70,000 francs yearly to the different proprietors, and carries on the work in a manner unknown among us. There are about 300 acres of sugar beets on the farm this year.

American plows are preferred in France to the English, though, to judge by those exhibited in the French annex of agricultural implements, both are frequently copied. The true French plows, however, are in excess of those of either of the foreign nations mentioned, and there is an abundance of crude and heavy implements which may be termed Gallo-Roman, and probably not much unlike those used during the Roman occupation.

Wooden mould boards are not totally discarded yet. Manufacturers may do their best to introduce what they deem to be improvements, but after all they are obliged to make what the people are willing to buy. Such plows weigh from 80 to 240 lbs., and sell for from 30 to 75 francs; and a great many are sold for light and sandy lands. While the English plows have generally two wheels to gauge the depth, it is by no means so universal in France, and the cheap plows, which are made as low as 35 francs, are frequently wheelless. The French catalogues divide them into "without wheels," "with one wheel," "with two unequal wheels." Fig. 2 has a frame entirely of iron, and of an ordinary size weighs 132 lbs., and costs 85 francs. It is a very good implement and does excellent work. Its clevis arrangement is good both for draught and depth, and the draught chain is likewise commendable. The two-wheeled plow is the English form, with furrow and land wheels of unequal sizes, but the lever is French, and is used to lift the front end and tilt up the point so that the team will draw it out of the ground at the end of the furrow: a very good arrangement, and used also on the gang plows of France and of England, the plowman always walking at work. These plows are made heavy and are drawn by four horses or oxen.

No plow on the field did any better work than the Albion, Mich., plow, and in respect to turning the stubble under and leaving a clean land it surpassed the others.

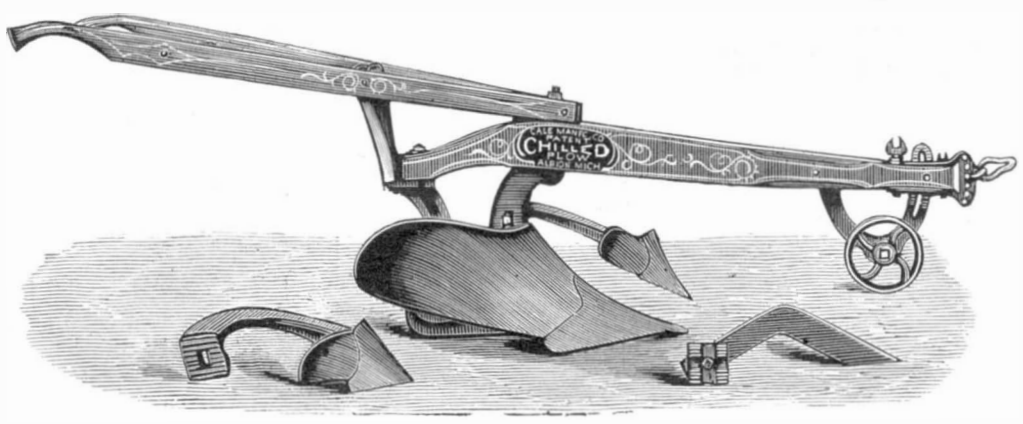

Fig. 4.—GALE'S MICHIGAN PLOW

Great interest was felt in the plows that had come so far to the trial, and perhaps the more that the English, who were so near and had an abundance of their plows in the Paris Exhibition building, had, for reasons best known to themselves, declined to come to the contest at Petit-Bourg.

In the next lot to the Michigan plow was one made by Speer & Sons, of Pittsburg, Pa. It was a fair representative of our common plow, made of good materials, and furnished at a very moderate cost; much cheaper to the dealers than the farmer has any idea of.

It must be noticed by all who travel by day in France that the usual plows have a fore-carriage which is intermediate between the team and the plow. Many extremely crude forms of this are to be seen, both in the fields and in the Exhibition, and were also at work at the trials at Petit-Bourg. Without attempting to give the cruder shapes, which might perhaps be taken as an exaggeration, the *charrue à chaine* is offered to exhibit the idea, and is one of the best of its class. Unlike the English two-wheeled plows, these wheels are of the same size, and as one runs in the furrow and the other on the land it looks as if the plow were tipped sideways, but the round beam adjusts itself in the socket of the fore-carriage (*avant-train*) and no harm results. These plows are made for four horses, and vary in price from 120 to 180 francs.

Fig. 7 shows a transition state, in which the nose of the plow is pivoted to the *avant-train*, instead of merely resting upon it and being drawn by a chain.

Another step and we assimilate to the modern English style. Fig. 8 shows Durand's single Brabant plow, in which the

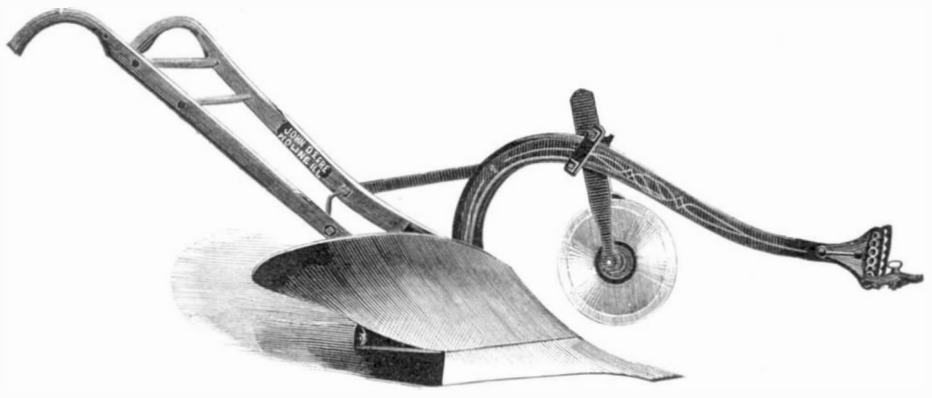

Fig. 5.—DEERE'S ILLINOIS PLOW.

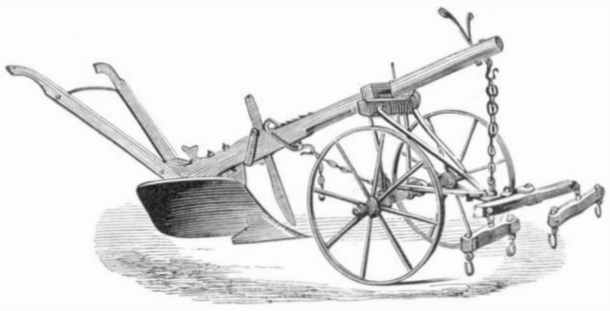

Fig. 6.—DURAND'S CHARRUE A CHAINE.

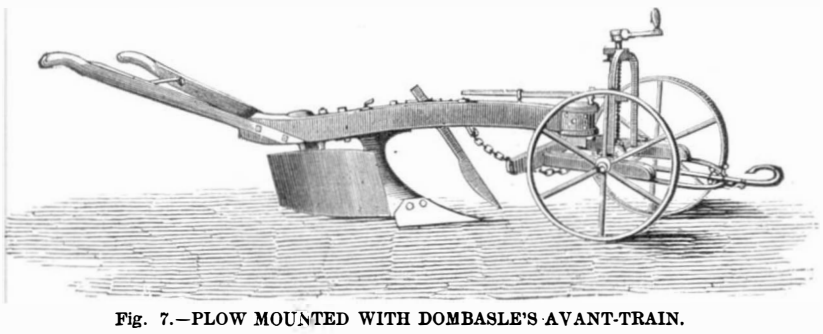

Fig. 7.—PLOW MOUNTED WITH DOMBASLE'S AVANT-TRAIN.

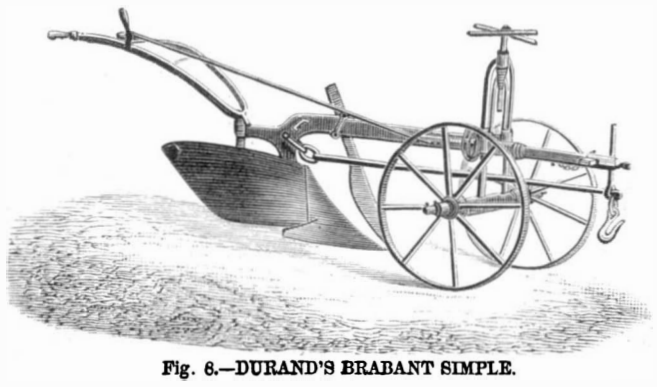

Fig. 8.—DURAND'S BRABANT SIMPLE.

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avant-train simply sustains the beam, and the draught is by a rod. In the circular handed to the spectators it is described as "intended for depths either ordinary or profound. It replaces with great advantage all the ancient models of plows. It will travel alone upon the earth without having care to hold the handles."

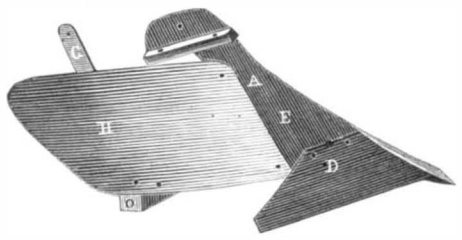

Fig. 9.—VIEW ON THE MOULD-BOARD SIDE.

We may as well dissect one plow, and this affords as favorable an opportunity as any. The plow manufacturers who may do me the honor to read these lines, and who may have a purpose to seek the French market, will thank me for matter which may inform them in advance of the degree of completeness of the French system of manufacture and of their methods of structure. I mention this as a reason for entering into careful detail in one instance, as I have no desultory purpose in view, but hope that my work may be useful in unfolding to those concerned the present status of a land that may become a good customer to our overloaded factories and shops.

The plow bodies are made applicable to any system of plows as well as to the *Brabant Simple.*

The makers advertise to furnish the parts of the body, which can be mounted on any plow by country shops, according to the local custom of the country.

They are made either in cast iron or chilled, and in 12 different sizes, from those adapted for 1 horse to those for 12 horses.

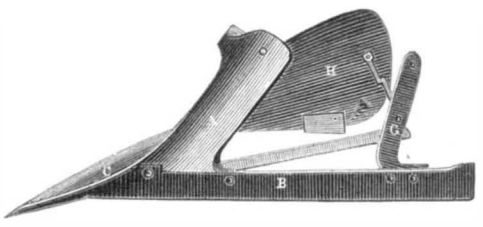

Fig. 10.—VIEW ON THE LAND SIDE.

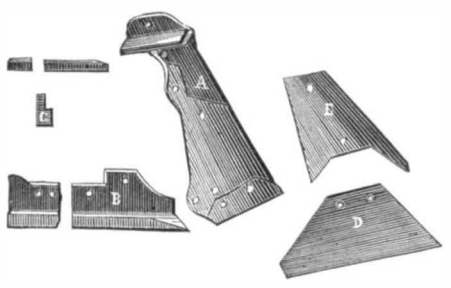

Fig. 12.—View of the Separate Pieces of the Plow Body, minus the Mould Board.

seldom use it for other purposes, was also exhibited. The English showed the same, but did not bring it to the trial. Speer, of Pittsburg, had a third form, in which shares are presented both forward and backward, and the beam revolves horizontally on a vertical pivot so as to bring either into action. Two mould boards are hinged to the breast of

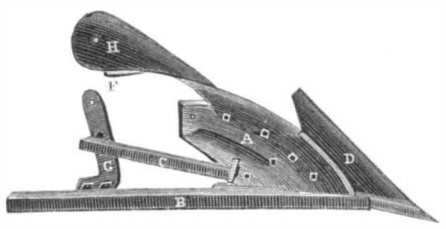

Fig. 11.—VIEW UNDERNEATH THE BODY OF THE PLOW.

the plow, and one or the other is brought into operation according to the requirement of the case. This also was not shown in the field experiments. The French are similarly constructed.

The Director-General, like many of us at home, regards the gang plow as the plow of the future in large farming operations, enabling one plowman or boy to do the work of two or more by adding to the capacity of the plow and increasing the number of horses to the required extent. Quite a number of French and one American gang plow were shown at the trials. None of the English.

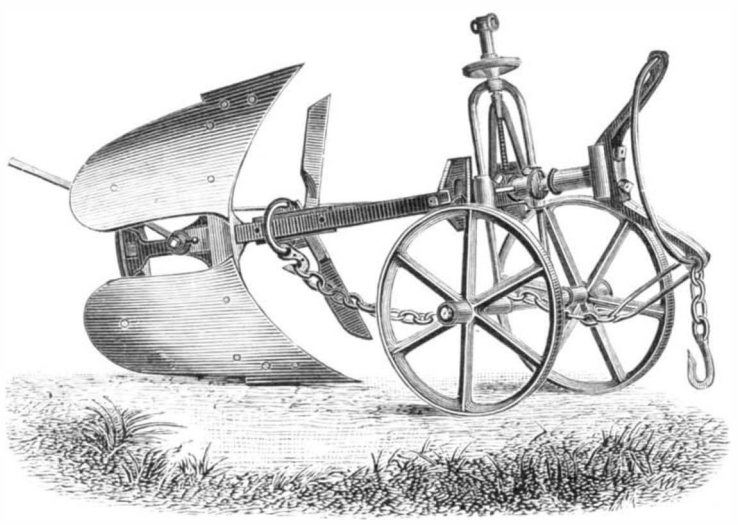

Fig 13.—BRABANT DOUBLE PLOW.

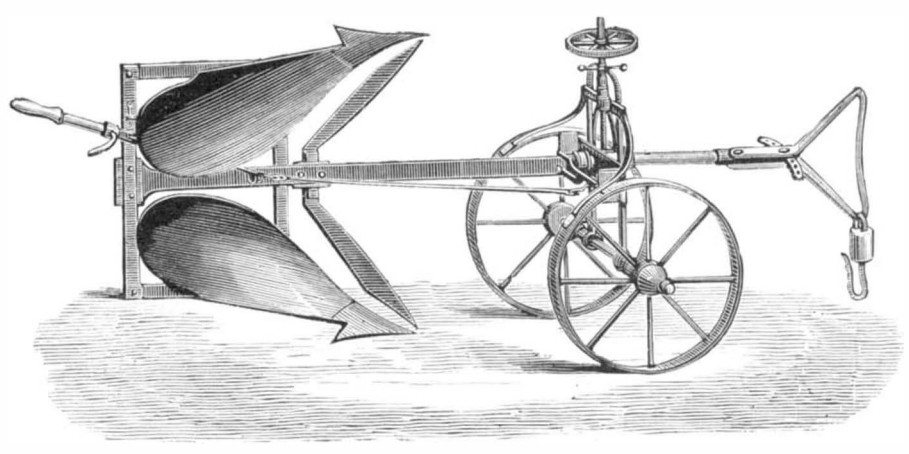

Fig. 14.—BODIN'S BRABANT PLOW.

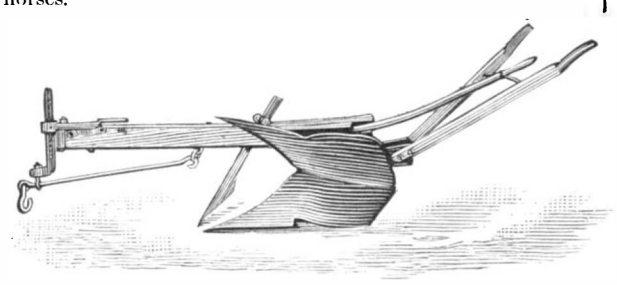

Fig. 15.—BRUET FRERES' TOURNE-OREILLE.

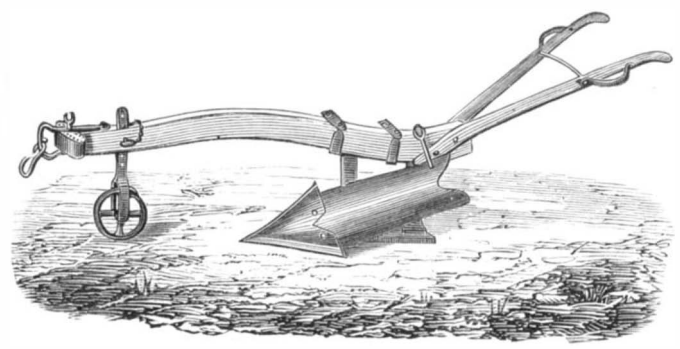

Fig. 16.—FRENCH TOURNE-OREILLE PLOW.

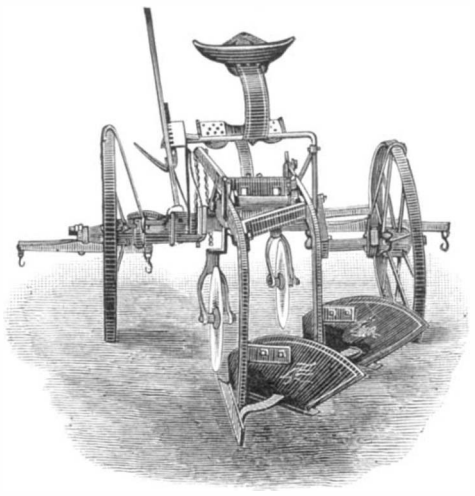

Fig. 17.—DEERE'S ILLINOIS GANG PLOW.

In Figs. 9 to 12, the portions of the plow body are shown. A is the standard, B the sole, C the corner piece, D the share, E the breast, covering the front of the standard, F is the heel piece to prevent wear of the mould board, G the rear standard, and H the helicoidal mould board.

The *tourne-oreille*, or Brabant double plow, has, as its name indicates, a turning mould board, so that at the end of a row it can be revolved on the beam (or the beam rotated), and converted from a right to a left hand plow or *vice versa.* This enables the team to return in the last made furrow, the near and off horses being alternately in the furrow. However clumsy it may look to us, it does excellent work, and if a whole community insists upon beginning to plow at the side of a field and plowing it furrow by furrow clear across to the other side, not plowing in lands, why of course they must have an implement to suit that mode of working, and here it is.

The Brabant plow is made of all sizes from the small plow adapted for one horse to the large one drawn by 5 yokes of oxen. They vary in weight from 165 to 770 lbs., and in cost from 140 to 300 francs. The depth of furrow for which they are designed is from 0·60 meter to 0·330 meter, say from 6½ to 13 inches, though the latter depth was much exceeded at the trial.

There are many different patterns of this implement, but all preserve the main feature of being convertible into a right or left hand plow, either by turning with a sleeve upon the beam or the beam itself turning in a socket on the forecarriage, or hinged to the beam, as in Fig. 15, which has a wooden beam, and no *avant-train.*

Another form of what we call a hill-side plow, as we

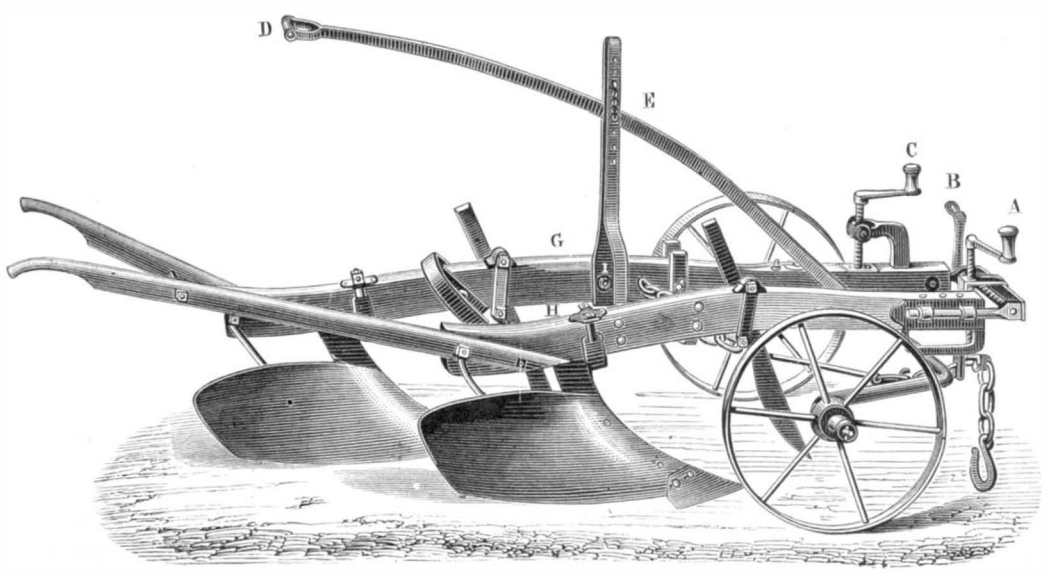

Fig. 18.—MEIXMORON-DOMBASLE'S BISOC.

The competitive trials of Deere's Illinois gang plow and the *bisoc* of Meixmoron de Dombasle, of Nancy, France. With the former the plowman rides, and with the latter he walks behind. It was difficult to give a determination between their respective values. In point of finished appearance the American plow was far ahead, and in the character of the material employed I should say it had the greater excellence. The riding feature was very curious to most of the spectators, and probably adds to the draught, which may tell when the dynamometer comes to be applied to them individually. During the day the French plow was worked with 6 horses and the American with 4; when they were started on a competitive trial, but 4 horses were allowed in each case, and the teams were changed

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when half the ground allotted had been plowed. At least that was the intention, but the teamsters in each case whipped up so cruelly that in mercy to the brutes—no, not the brutes, but the horses—the trial was concluded rather sooner than was intended.

Another episode more amusing than the suffering of the fat Percheron horses was afforded by the fact that when the teams were changed and the teamsters, the latter tried to work in the interest of their former employers. The team of the French plow balked for a little while, and the man with the team on the American plow ran ahead of his horses for fear the French plow might be beaten. They also managed to smuggle both the whips to the French side, and slashed away, while Mr. Deere had only his umbrella to poke up the four horses on his plow.

This was only some by-play of the French teamsters and was soon stopped. There are no fairer people in the world than the French judges, but the workmen could not forbear trying to take advantages.

The Meixmoron-Dombasle *bisoc* is made of three sizes; the largest works to a depth of from 0·15 to 0·20 m. (6 to 8 inches); a land of 0·55 to 0·60 m. (22 to 24 inches) in the width, with 4 to 6 horses in ordinary land and 6 to 8 horses in hard ground. The smaller sizes use from 2 to 6 horses. The *grand bisoc* with cast iron standard and steel mouldboard weighs 544 lbs. and costs 290 francs.

The lightest size weighs 268 lbs. and costs 175 francs.

The Deere plow weighs 670 lbs. and costs 425 francs.

The Dombasle system, as is apparent by the cut, consists in rigging two plows to a single fore-runner with an inflexible bar which determines the latitude. In that respect it resembles our gang plow. The English system is to make an angular frame of iron, and the same plan has also been adopted in France, and several of the manufacturers had implements of this description on the ground.

There does not seem to be anything to urge against the principle of these, and they work well, but the plow Fig. 18 was preferred. In each case the long backwardly extending lever raises the forward end, so that the plows come out of the ground as the team reaches the end of the land, ready for turning.

The Gilpin sulky plow made by Deere & Co., of Moline, Illinois, was an object of much attention. So much regard has not usually been paid to the comfort of the workman. Our horse rakes usually have seats, and it is no uncommon thing to ride on our grain drills. It is not so here.

Besides the plows for executing the usual work, at this *concours* there were ridging, subsoil, trenching, and mole plows, implements for digging potatoes, pulling up beets; harrows, rollers, clod-crushers, potato planters, grain and seed drills.

The ridging plows, *buttoirs*, were stocked with wooden or iron beams, and are much used in the potato and beet culture; the rows of these are so close that the *buttoir* will ridge up against the plants on both sides going once in a row. These plows weigh 120 lbs. and cost 85 francs.

The subsoil plows are those which work behind an ordinary plow to break up the hard pan, but not to elevate it above the surface mould. Quite a number were exhibited, of which Fig. 22 is fairly representative. The price is 45 francs.

The trenching or ditching plows exhibited at Petit-Bourg were of two kinds. One had a deep cutting share, a sloping breast, and a curved board which directed the excavated soil on to the land at the side of the ditch. This is shown in Fig. 23.

The other one is adapted for cutting drains in natural prairies. The sloping cutter and the curved share cut the sod, which is lifted and thrown equally on each side of the ditch. The plow has an ordinary *avant-train*, not shown in the figure.

The *sous-sol*, or underground plow, known to us as the mole plow, from the mode and effect of its work, is used as with us as a mode of effecting drainage of soils where water stands too persistently. Several of these were shown, but do not differ except in details.

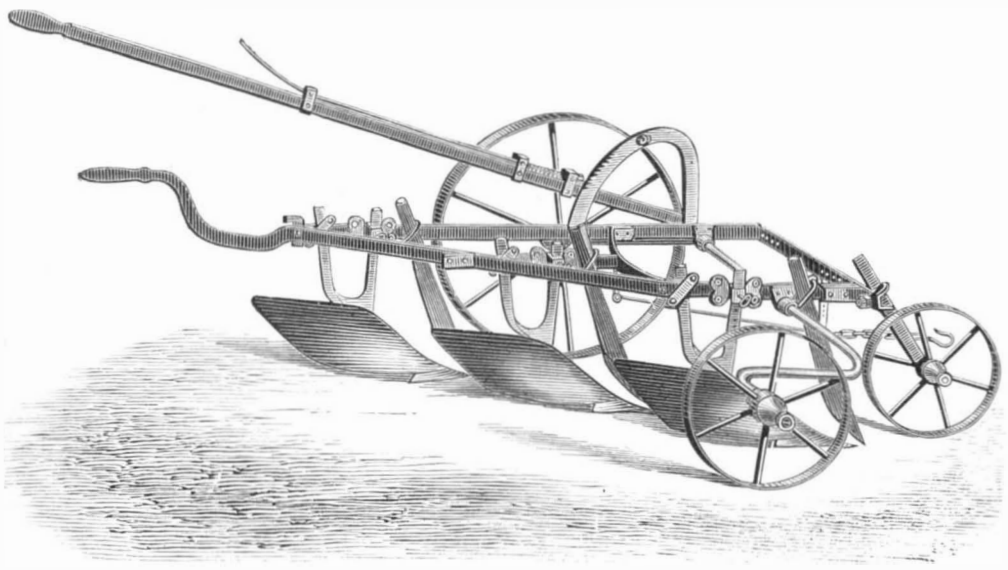

Fig. 19.—DALAHAYE-TAILLEUR'S CHARRUE A TROIS-SOCS.

The potato diggers were of single and double effect. One has but one set of lifting fingers, the other has two grids. The first runs beneath the hills of potatoes and lifts them, the soil falling between the bars of the grids, leaving the potatoes on the surface. The second grid repeats and completes the operation.

Comparatively few people out of France have any adequate idea of the extent of the culture of the beet root. It furnishes nearly all the sugar used in France and a large proportion of the alcohol. The neighborhood of Paris is distant from the principal regions concerned in this culture, and the field of 300 acres of beets on the farm at Petit-Bourg, where the trial of plows took place, is regarded as but a patch. At Marmont, where the trials of reapers, binders and mowers were held the week previous, there may have been about 250 acres in beets. One item in passing: 85 acres of beets on M. Charlton's farm at Marmont yielded last year 115,000 francs' worth of alcohol, tax paid. The tax on the yield of alcohol was over 1,000 francs per acre. The farmer and the government between them realized the amount stated from 85 acres of beets. Several special implements have been made for the beet culture—plows which turn up the soil to a depth of 15 inches; subsoilers, which pulverize a further depth of 6 inches in the bottom of the first furrow; light plows for throwing the soil to or from the plants alternately in the process of tending the crop; double mouldboard plows for throwing the earth against both rows while passing once down the balk; machines for tearing the roots out of the ground, leaving them on the surface, to be picked up in baskets and carried to the carts, or, as in the case of M. Decauville's farm at Petit-Bourg, to the miniature cars on the narrow gauge railway which runs around the principal fields and enables a horse to draw several tons, while the baskets do not need to be lifted more than 3 feet to empty them into the cars.

A beet puller, such as shown in Fig. 28, will deplant two and a half acres per day, and is converted into a potato digger by detaching the fork, 1, Fig. 29, and attaching the grid, 2. The point of excellence in an instrument of this kind is that it shall not cut the beet, and that it shall raise it and turn it over, and not wrench it out in such a manner as to break off the tap root and cause it to bleed. The price of the machine, made in three sizes, is from 170 to 200 francs.

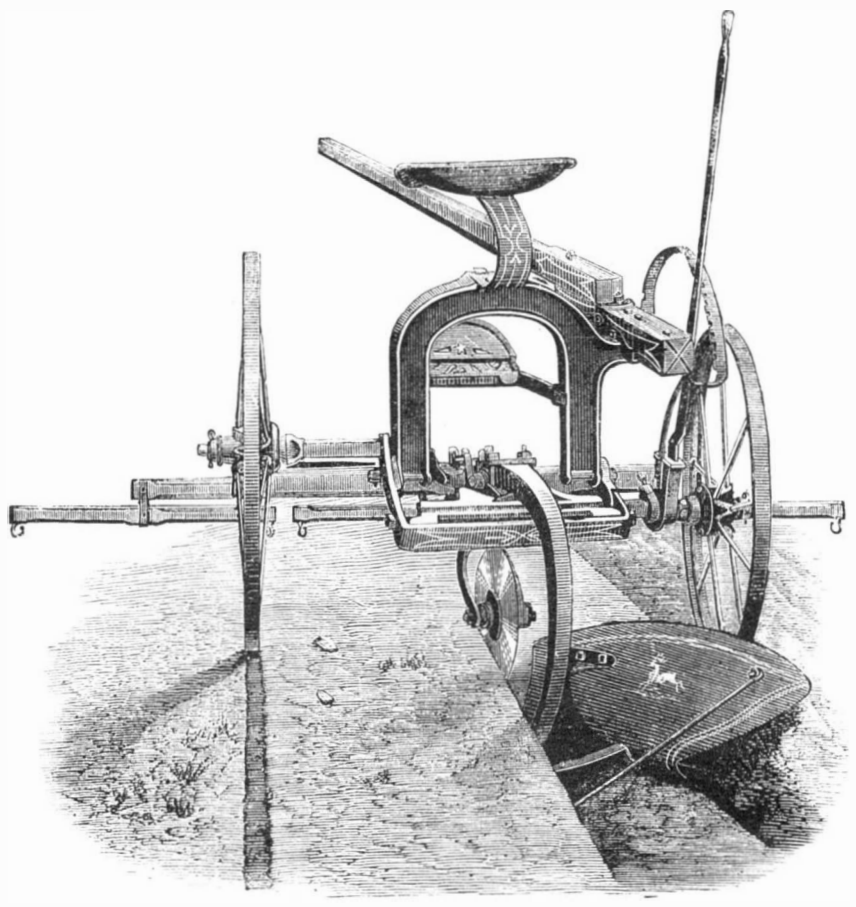

Fig. 20.—GILPIN SULKY PLOW, MOLINE, ILL.

The work of the harrow and rollers followed that of the plows, and some matters worth our consideration were shown, but the report will be too long if we consider them now.

Eleven exhibitors entered their grain and fertilizer drills, from France, England, Italy, and the United States. European nations still adhere to their plan of revolving wheels with little cups at the ends of their spokes ascending through the reservoir of grain and dropping a little tribute of seed into a cup, whence it reaches the ground through tin tubes in the rear of the share. It is the old plan used 1,000 years ago in India, and has long been superseded in the United States by various force feed arrangements. The European broadcast fertilizer sowers were several of them of good quality, but by far the best grain drill on the ground was the "Farmer's Friend," from Dayton, Ohio.

In conclusion, it is necessary to state that all the trials have taken place under the care of the Exhibition authorities, and the jury of Class 76 (agricultural instruments in the field) attended them officially, as an additional means of determining the recompenses of prizes and medals under the general regulations. There was no compulsory attendance of exhibitors, but the field was thrown open for all who volunteered to compete.

The Agricultural Society placed 12 objects of art at the disposal of a jury specially constituted, and including the members of Class Jury 76, to reward "exceptional merit" which they might find in the machines exhibited. These were independent of the recompenses of the Exhibition proper, as announced in the "Réglement Général," dated in 1876. Six of these trials have been held: Mowers, reapers, and binders. Steam and other plows, with other instruments for working in the soil; Hay presses and implements of the homestead; Thrashing machines; Lawn mowers; Lawn and road sprinklers.

I do not delay this letter to give either the dynamometrical indications of the draught of the plows, or the decisions on the objects of art, as the trials are not quite through; nor the prizes and medals obtained by the machines which joined in the trials, because these, though known to me as juror, are not yet public.

EDWARD H. KNIGHT.

Paris, August 10th.

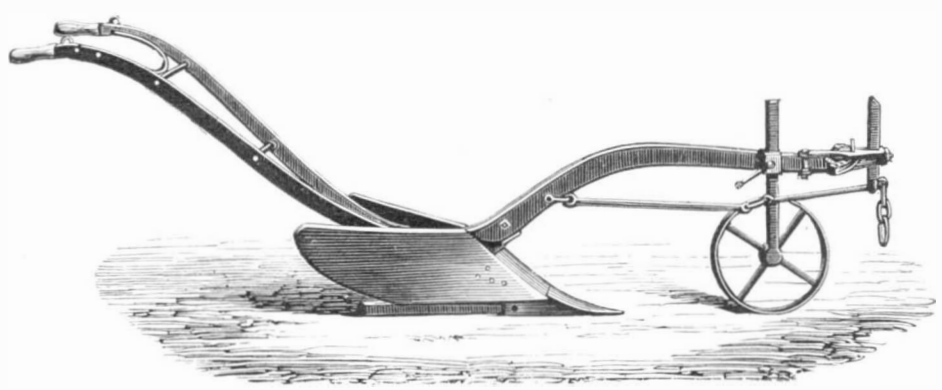

Fig. 21.—BUTTOIR, OR RIDGING PLOW.

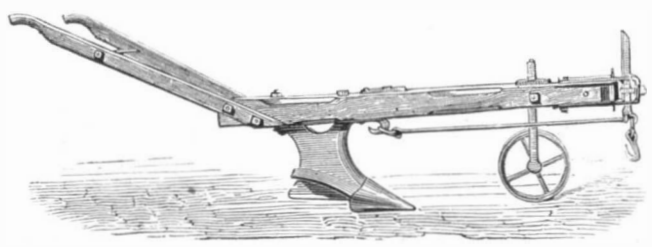

Fig. 22.—GARNIER'S SUBSOIL PLOW.

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Recent Inventions.

Mr. William Humphrey, of Jackson, Mich., is the inventor of an improved Washstand or Lavatory for factories, prisons, etc., by which a large number of washbasins are conveniently arranged for use, and all filled and discharged at the same time, so that a large number of persons can wash themselves at the same time.

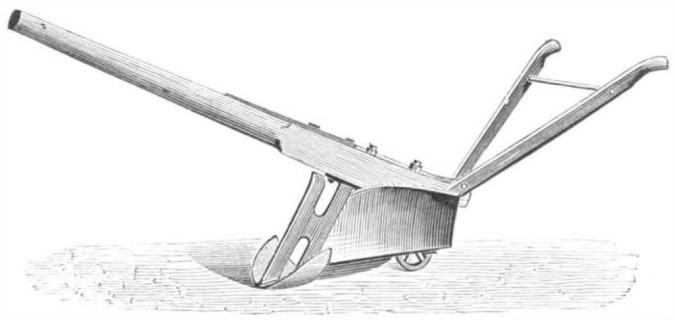

Fig. 24.—BILLOT'S TRENCHING PLOW.

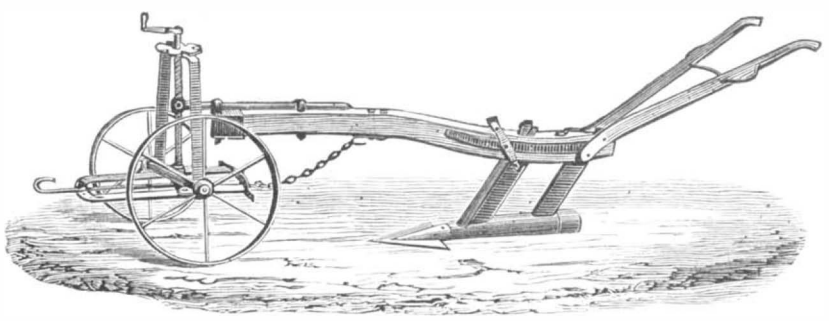

Fig. 25.—MOLE PLOW.

Mr. John W. Porter, of Westport, Conn., has devised an improved Mill Spindle, which is so constructed as to prevent vibration, so that the stones will run truer and will grind the grain evener, making more and better flour than is otherwise practicable.

Messrs. Denison L. Howard and Thomas D. Atkinson, of Nottawa, Mich., have patented an improved Apparatus for separating Gold from sand and dust or powdered rock. It is so constructed as to effect the separation of the gold without using water.

Mr. Edward P. Follett, of Rochester, N. Y., has devised an improved Attachment for the Burners of Lamps, Kerosene Stoves, etc., the use of which will insure a more thorough combustion of the oil, and will produce a steadier, whiter, and larger flame than is possible with ordinary burners of the same size.

Mr. Benjamin R. Tenney, of Poughkeepsie, N. Y., is the inventor of an Attachment for Coal Scuttles and other vessels, which will enable them to be used for sifting the unburned coal from the ashes in the room where the coal was burned, and even upon a carpet, without allowing any fine ashes to escape into the room.

Mr. William R. Macdonald, of Allegheny, Pa., has patented a Combined Heating and Ventilating Apparatus, that may be used either solely as a heater, or as a heater and ventilator, or, for summer use, as a ventilator alone, the same supplying the heat in the customary manner, but drawing off the vitiated and foul air from apartments, water closets, soil pipes, etc., and conducting it away, supplying pure air in place of the same.

Mr. John F. Taylor, of Glenville, Conn., has patented an improvement in Steam and Hydraulic Presses. This improvement consists in adding to the press an auxiliary steam cylinder, having a still larger ram, for reducing the bulk of the matter in the press before applying the heavier pressure created by the smaller rams. The piston of the auxiliary steam cylinder is operated by the exhaust steam from one or both of the cylinders, before described. The object of the invention is to effect economy of fuel in working hydraulic presses, and to accomplish the work by means of smaller steam cylinders than have been hitherto employed.

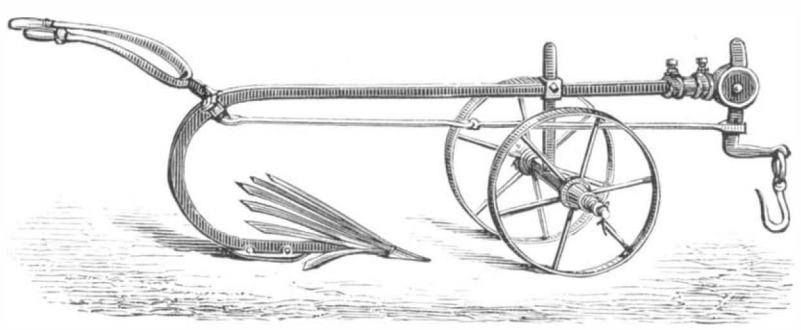

Fig. 26.—POTATO DIGGER (*Arrache pommes de terre*).

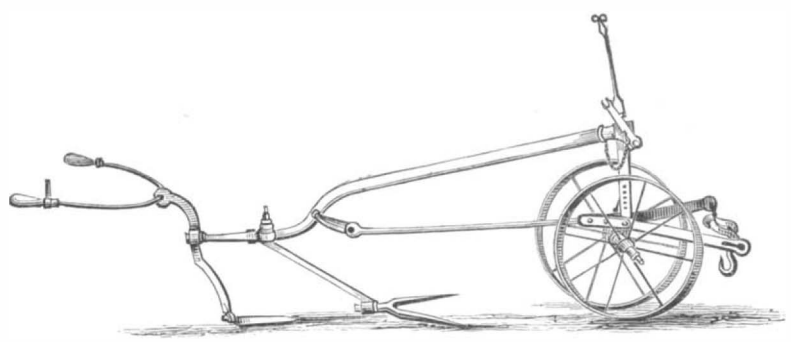

Fig. 28.—BEET-ROOT PULLER (*Arrache Betteraves*).

A novel Apparatus for Demonstrating Military Tactics has been patented by Col. William H. Brownell, of Brooklyn, N. Y. The object of this invention is to provide a device for illustrating the principles of military tactics, and especially for the demonstration of Upton's tactics.

Mr. Thaddeus O. Kilburn, of Washington, Minn., has patented an improved Bolting Reel that is more especially designed for the cleaning and dusting of middlings, but that will also work with great efficiency for other bolting, as by the reel the sliding of the meal is facilitated and a superior bolting obtained.

Mr. William W. Stetson, of Henry, Ill., has patented an improved Double-acting Force Pump, by means of which a large amount of water can be raised. The principal feature of the invention is the peculiar arrangement of the valves.

Mr. Joseph W. Holmes, of Wheatville, N. Y., has patented a novel Apparatus for Accurately Determining the Solar Time in any latitude or longitude, the true meridian, the sun's declination, and the latitude of any place; and consists in a quadrant or segment of a circle, graduated to degrees and subdivisions thereof, mounted on a horizontal axis; and in a graduated circle fixed upon the quadrant or segment

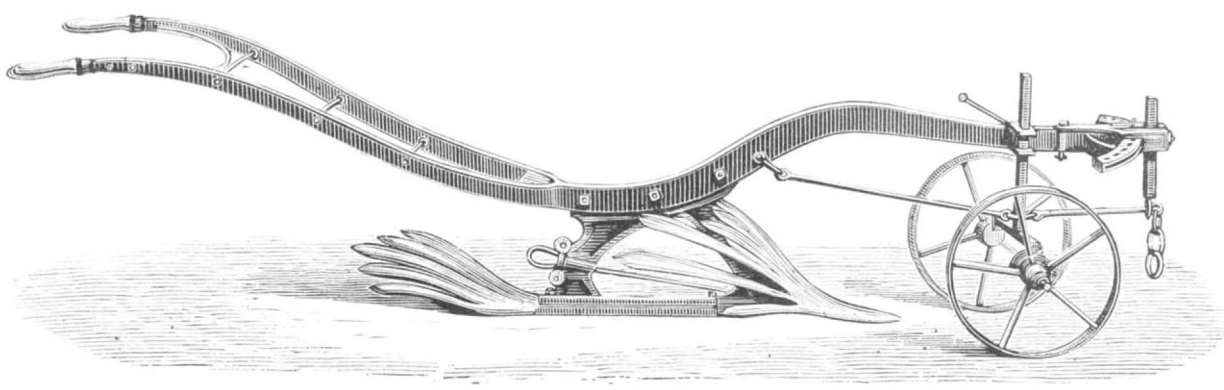

Fig. 27.—POTATO DIGGER (*Double-effet*).

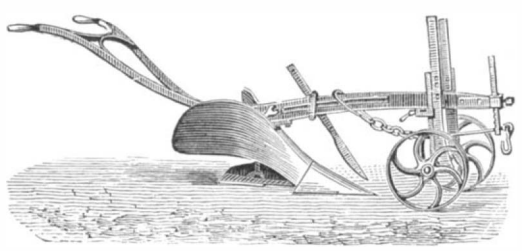

Fig. 23.—TRENCHING PLOW.

and at right angles to its plane; and in a graduated circle pivoted on one of the arms of the quadrant or the axis of the quadrant or segment, and parallel with the fixed circle; and also in a graduated arc mounted on the face of the pivoted circle, and provided with a traversing arm having a vernier and apertures for casting the sun's image, for surveying or other purposes.

An improvement in Breech-loading Firearms has been patented by Mr. John T. Morrison, of Fort Concho, Texas. This invention relates to improvements in breech-loading firearms, such as carbines, muskets, rifles, etc. With this improvement the firearm may be manipulated with greater facility and safety, either on horseback or not, as the loading of the cartridge as well as the ejecting of the shell is performed easily and rapidly with the right hand, while the barrel may be swung on its pivot in the hollow of the left arm without detaching the firearm, when used as a carbine, from its sling, or without removing the left hand from the reins in governing the horse.

The Thread Telephone.

N. R. Huntley, engineer at the Connecticut River Railroad shops, Springfield, Mass., who succeeded in operating a twine telephone across the river, a distance of 1,426 feet, has been further experimenting, and is now able to talk freely and plainly across the river, a distance of 2,450 feet, or within 190 feet of a half mile. For boxes, or mouth-pieces, he uses the same tin ones as with his previous experiment, except that for the silk disk he substitutes thin button iron. To make the experiment more complete and seemingly more difficult, he has run his line in a zigzag way, making numerous angles, but finds that it is no less effective than if perfectly straight. For hangers he uses heavy wire pins, on the ends of which he

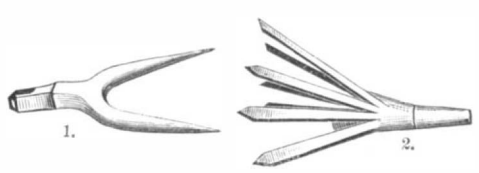

Fig. 29.—1. *Soc à fourche pour arracher les Betteraves.* 2. *Griffe à arracher les pommes de terre.*

fastens small non conductors of glass, the line being fastened to these by a loop of twine about half an inch long. Without these non-conductors the sound passed off at each support. Mr. Huntley has not the least doubt of his ability to use these lines at a distance of a mile, and perhaps further, and is also confident that for ordinary use, such as carrying on conversation between neighbors and friends, they will be brought into general use.—*Boston Advertiser.*

New Engineering Inventions.

Messrs. Elias R. Clark and Robert Hamilton, of La Fayette, Ind., have patented a Feathering Paddle Wheel, which is so constructed that the paddles will leave the water edgewise so as not to lift the water, which will hold the paddle vertical while acting upon the water, and which will cause the paddles to act upon the water as long as they remain it.

Mr. William Roberts, Jr., of Calumet, Mich., has patented an improved Signaling Apparatus, whereby the engineer can be notified when and where a car has arrived at the shaft, so that the skip can be run to that level and the car hoisted to the surface without delay. A vertical upright signaling rod, extending from the surface of the ground to the bottom of the shaft, is used. This rod is supported in suitable bearings, and is provided with levers, so it can be raised and lowered by the workmen at the levels. Means for locking the signaling rod at each level are provided, and the rod has indicators for showing the signals.

Mr. William H. Lynn, of Freeport, Ill., is the inventor of a simple and effective Starter for street and other cars drawn by animals; and it consists in a sector lever pivoted in supports attached to the car frame, and connected by a chain with the draw bar. The said sector lever is provided with a pawl, which engages a ratchet wheel on the car axle, and is provided with two springs, which throw it into and out of engagement with the ratchet wheel.

Mr. Milton Logan, of Foxburg, Pa., has patented an improved Car Coupling, which consists in a novel arrangement and combination of hook headed draw bars and levers for operating the same, whereby provision is made for coupling and uncoupling the cars by raising and lowering said draw bars; and the invention also consists in a novel construction of an extension buffer, to be used when necessary, and to be placed out of the way when not in use.

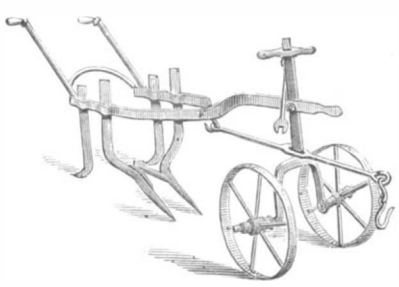

Fig. 30.—BEET-ROOT PULLER.

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A NEW SHEEP PROTECTOR.

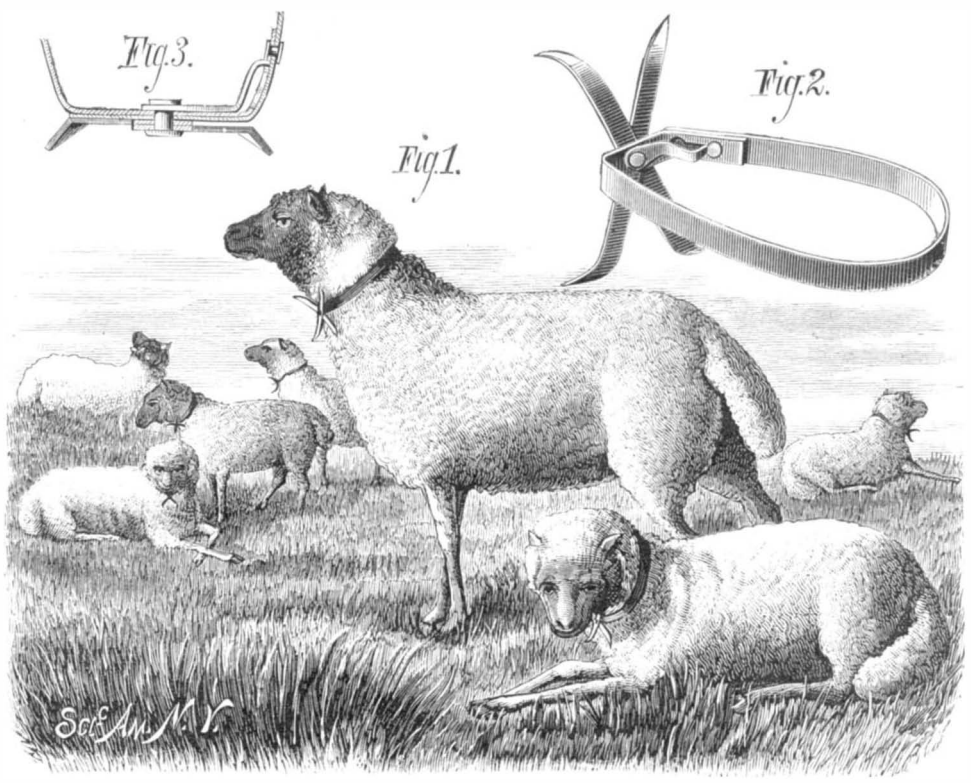
It is estimated that the annual loss in the United States by the destruction of sheep by dogs is more than a million of dollars. In the State of Georgia alone the yearly loss from this cause amounts to the round sum of $73,852. To remedy this evil and to avoid the loss, Captain Cephas Gilbert, of Bucksville, S. C., has, after several experiments, perfected the sheep protector shown in the engraving. It is stated that dogs invariably attack the necks of the sheep, the object being to sever the arteries and drink the blood.

The device illustrated consists of an oval collar formed of hoop iron, with overlapping ends, which are straight and parallel with each other. In one of these ends there is a rivet, the head of which projects through a slot in the other end. One end of the slot is enlarged to admit of fastening and unfastening the collar. The part of the collar that comes under the throat is straight, and to it are secured by a single rivet two short bars, which are crossed and pointed. The same rivet that fastens these bars is used as a pivot for the spring button, which is employed to secure the collar against accidental unfastening. The relation of the button to the other parts is clearly shown in the perspective view, Fig. 2, and the section, Fig. 3.

Besides protecting the sheep against dogs, the collar serves another important and humane purpose. The common method of indicating the age of the sheep is to slit or punch the ears. This collar affords an excellent surface on which to stamp dates and the owner's name. The inventor states that the oil from the wool protects the collar against corrosion. By means of a suitable crook, the sheep may be readily caught by the collar, thus avoiding the tearing of the skin and injury to the sheep, which frequently results when sheep are caught by the wool.

Captain Gilbert has devised a shearing table which, in connection with the collar, greatly facilitates the operation of shearing.

This invention was patented June 18, 1878, and another patent is pending. For further particulars address Thomas W. Beaty, Conwayboro, S. C.



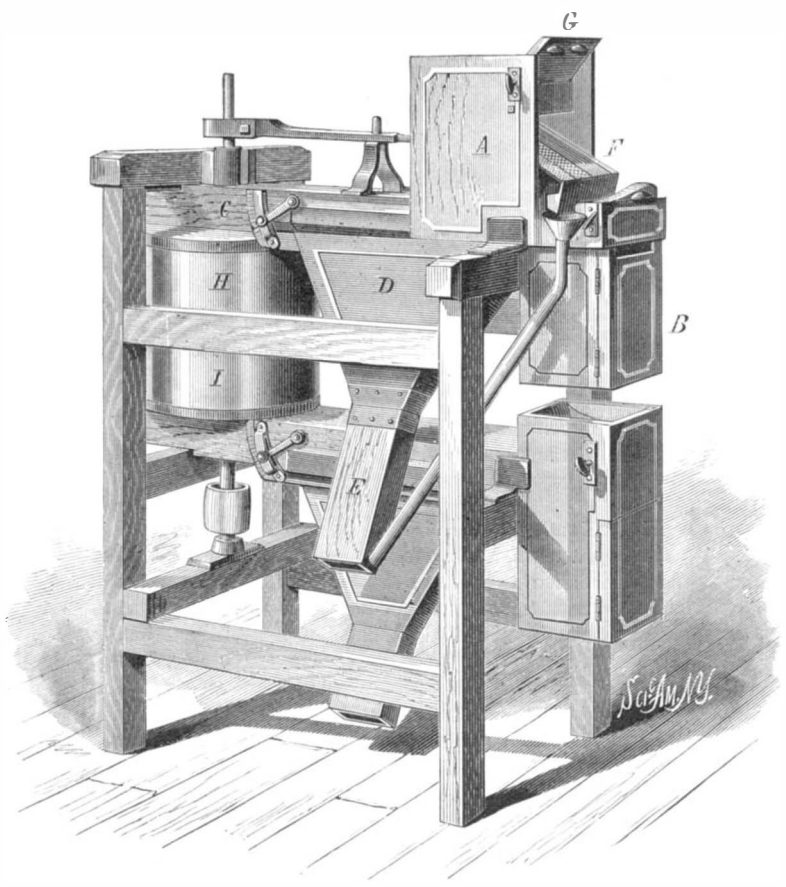
GILBERT'S SHEEP PROTECTOR.

ELWELL'S MIDDLINGS SEPARATOR.

The system of close grinding which was prevalent a few years ago is now fast giving way to a sensible system of granulation. The grain is now ground high enough to avoid over-grinding any portion of the flour. The middlings separator or purifier, shown in the engraving, takes out the specks and light particles. All heavy particles of the grain are returned to the eye of the stone and whittled a little smaller, and if any particles are yet heavy, they are still valuable, and their weight causes them to return to the stone again and again, until they are divested of all the flour, while the remainder, being light, goes out with the blast. In this way the grains of the flour can be made more uniform in size than by any other system of grinding.

In the upper part of a vertical draught box, B, are placed a number of inclined slats, which break and distribute the downward flow of middlings and the upward current of air. The said slats are located at the entrance of a horizontal box, C, along which the particles carried over from the vertical box are transported to the hopper, D, and are discharged through the spout, E. The middlings are fed into the horizontal box from the hopper, A, passing upon a vibrating shoe, F, and their supply being regulated by slides, G. The horizontal box, C, is provided with a regulating valve (which is not shown in the engraving) for controlling the air current as required. It is also provided with air checks or breakers, which, by forming eddies, allow nearly all of the air separations to settle in the hopper, D, only a small portion of the lightest particles passing out through the fan, H. Below the apparatus thus described is arranged a duplicate set of mechanism, in which the middlings, falling from the vertical box above, are again treated by air currents set in motion by the fan, I.

This separator is designed expressly to work on buckwheat middlings, but it does good work on both wheat and rye. It is said to stand the test as establishing a new method of purifying middlings, avoiding the use of sieves, bolting cloth, or brushes, to wear out, and intricate machinery to get out of order. It is substantially built, simple in its construction and manner of working, easily regulated, occupying but small space, and requires but very little power to run it. It wastes nothing, and the moment the hopper is empty the machine is clear, nothing being left in it to mix with the next grist. It is the machine that is especially adapted to custom milling, to purify middlings, putting them in suitable condition to be reground with the grain without waste. For further particulars address the patentee, Mr. Morris N. Elwell, Oneonta, Otsego county, N. Y.



ELWELL'S MIDDLINGS SEPARATOR.

Hydraulic Cement.

An excellent cement for foot-walks, and for all uses which require exposure to the weather or to dampness, is described in *Der Practische Maschinen-Constructeur*. It is made by thoroughly stirring Portland cement, or good hydraulic lime, into a warm solution of glue, so as to make a thick paste, and applying it immediately. In three days it acquires extraordinary hardness and tenacity. It is an excellent cement for joining the porcelain heads to the metal spikes which are used as ornamental nails.

New Agricultural Inventions.

Mr. John H. Gilleland, of Peek's Hill, Ala., has patented an improved Plow, by which plow-hoes of different thicknesses may be interchanged and rapidly and securely fastened upon the same standard, and by which the depth of the plow and the elevation of the handles may be easily regulated and adjusted.

Mr. John T. Ewan, of Bethalto, Ill., has patented an improved Grain Separator, in which, in place of the blowing fan, a suction fan is used, whereby a superior separation of the dust and other impurities from the grain is obtained.

An improved Hedge Plashing Machine has been patented by Mr. Alva S. Warren, of Atlas, Ill. This invention relates to a machine for laying or bending the hedge, instead of cutting or breaking it down; and it consists in a novel combination of devices for gathering the upper branches of the hedge, and for twisting them into a rope-like form, whereby the upper portion of the hedge is made to present a neat and uniform appearance throughout, and is at the same time greatly strengthened.

An improved Grain Separator has been patented by Mr. Samuel Stone, of Bristol, Tenn. The object of this invention is to furnish an improved machine for removing from wheat cockle seed, cheat, and other impurities which cannot be removed by the ordinary fan mill.

Mr. Alexander Thomas, of Ledyard, N. Y., has patented an improved Grain Separator, which consists in a sheet metal cylinder revolving upon an inclined central axis, and perforated with longitudinal cup slits in circumferential rows, arranged to break joints each with the next. A cam wheel secured upon the cylinder shaft vibrates the cylinder by contact with a stationary pin. A stationary brush is arranged in contact with the surface of the cylinder, to clear out all seeds that may lodge in the perforations.

Mr. Henry D. Terrell, of Starrsville, Ga., has patented an improved scraper for attachment to the stocks of shovel plows and other plows to do the work of a sweep.

Mr. William N. Phipps, of Glenwood, Iowa, has patented a cheap and simple device to be used at thrashing machines, for ascertaining the number of bushels or half bushels of grain thrashed. Figures marked on the tape, and visible through a glass pane on the cover of the box in which the apparatus is inclosed, indicate the number of teeth moved forward, and consequently the number of half-bushel measures successively placed upon the hinged lid.

Mr. Charles V. Baker and Jacob W. Baker, of Middlebourne, Ohio, have patented an improved Churn, which is simple, inexpensive, convenient, and effective, bringing the butter in a very short time, and developing all the butter there may be in the milk.

Mr. Sheldon E. Harris, of Whitesburg, Tenn., is the inventor of an improved seed planter, which is so constructed as to open a furrow to receive the seed, drop the seed, and cover it; it may be adjusted to plant the seed at any desired depth in the ground, and may be drawn from place to place without operating the seed-dropping device, and it may be readily adjusted for use as a cultivator when required.

Mr. Hugh S. Jory, of Salem, Oregon, has patented an improved Hinge for the frames of harrows and cultivators, which is so constructed as to keep the parts of the frame in proper relative position while allowing them to adjust themselves freely to the surface of the ground. The parts of the frame may be readily raised to pass stumps, stones, and other obstructions, and to free the teeth from grass, weeds, and other rubbish, that would clog them and impair their proper operation.

Mr. George W. Ross, of Newton, West Va., is the inventor of an improved Harrow that has the advantage that all its parts or sections may be conveniently raised or lowered from the driver's seat, so as to pass over obstructions without injury and delay, and which may also be easily moved from place to place without detaching any one of the working parts.

Messrs. Addison H. Whiteside and Milton S. Whiteside, of Onarga, Ill., have patented an improved Means for Connecting the Sections of a Harrow Frame with the Draw Bar, so that the said sections will be held firmly in place laterally, while being free to move up and down to adjust themselves to the surface of the ground and to be cleansed.

An improved Grain Separator has been patented by Mr. Daniel O. Harshman, of Shannon, Ill. The invention is an improvement in that class of thrashing machines in which a series of rakes having a reciprocating and rising and falling movement is employed in connection with an endless traveling apron or carrier.

Mr. Charles Brustman, of Fremont, N. Y., has patented an improved Straw Cutter. The wheels on the driving shaft are of peculiar form and have different diameters, and the two wheels on the feed roll shaft are also of different diameters, and are arranged to slide on the roll shaft, so that either of them may be thrown into gear with its driver. This straw cutter has other novel features which cannot be well described without an engraving.

Messrs. David H. Weaver and Martin Heatwole, of Spring Creek, Va., have patented an improved Reversible Line or Rein Holder, conveniently attachable to either side of the harness, to prevent the lines or reins from dragging.

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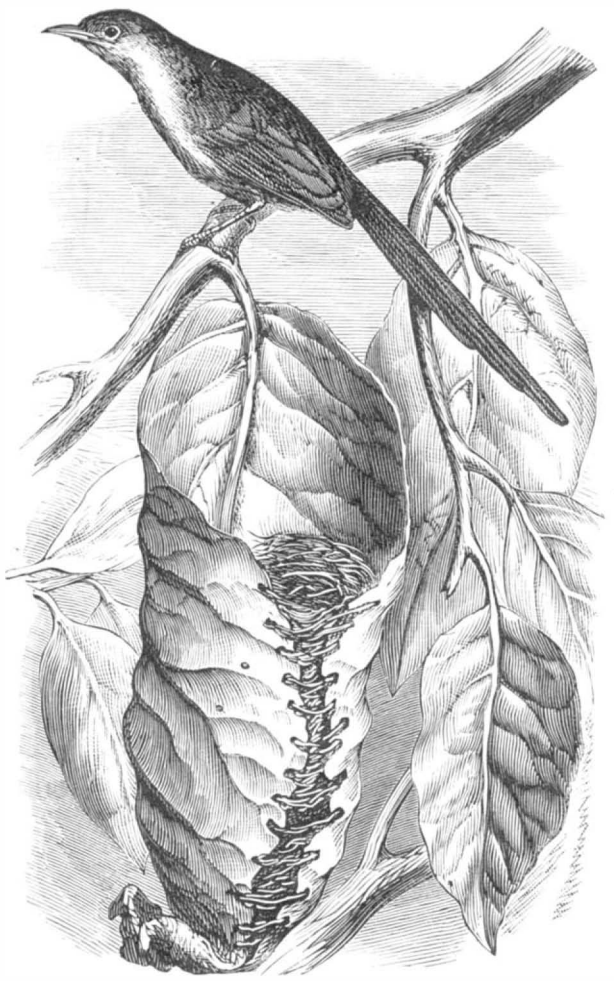
THE TAILOR BIRD.

The tailor bird, which is found in India and the Indian Archipelago, is a sober little creature, not more conspicuous than a common sparrow, and is chiefly remarkable for its curious nest, which is made in a singular and most ingenious manner. Taking two leaves at the extremity of a slender twig, the bird literally sews them together at their edges, its bill taking the place of the needle, and the vegetable fiber constituting the thread. A quantity of soft cottony down is then pushed between the leaves, and a convenient hollow scraped out, in which the eggs may lie and the young may rest at their ease.

Sometimes, if the leaf be large enough, its two edges are drawn together, but in general a pair of leaves are needed. A few feathers are sometimes mixed with the down. This curious nest is evidently hung at the very extremity of the twigs in order to keep out of the way of the monkeys, snakes, and other enemies which might otherwise attack and devour mother and young together.

We take our illustration from Wood's "Natural History."



THE TAILOR BIRD.

THE AMERICAN ARCTIC EXPEDITION.

Mr. James Gordon Bennett, the energetic proprietor of the New York *Herald*, having, by a liberal expenditure of capital and the indomitable perseverance of Mr. H. M. Stanley, succeeded in opening out the hitherto unexplored portion of the African continent, has now turned his attention from tropical to Arctic exploration, and is organizing an expedition, entirely at his own cost, which is to make yet another attempt to reach the North Pole. For this purpose he has purchased the well known Arctic yacht Pandora, which, under the command of Capt. Allen Young, has already achieved important work in the North Polar regions. The Pandora, which has been rechristened the Jeannette by Mr. Bennett, is a screw steamer of some 250 tons burden, and is fitted with engines of 80 horse power. She is specially built for Arctic service, and, in addition to a hull of more than ordinary strength, is sheathed from eight feet above her keel to two feet above her water line with a coating of American elm some three inches thick, so that her resistance to the nipping of the ice may be rendered as great as possible. The rudder can be dismounted and replaced in case of accident, and she is fitted with a perfect magazine of appliances and instruments for Arctic exploration, such as sledges, ice saws, tents, ice anchors, etc.; while she carries about 164 tons of coal, her daily consumption, when steaming four knots an hour, being reckoned at three and a half tons. The hull, for greater safety, is divided into three water-tight compartments, and, since the 1st of April, has been under the hands of the shipwrights, and has been thoroughly and completely repaired, any injured woodwork being removed and replaced by new. In the stern, also, a comfortable cabin has been formed for the officers. On June 18, as we have said above, Mr. Bennett rechristened the vessel the Jeannette, and she has now sailed for San Francisco, where her fitting out is to be completed in time to start on her journey next January, when she will attempt to attain the North Pole by way of Behring Straits. At the same time Mr. Bennett will dispatch another yacht, the Dauntless, which will also try to reach the Pole by way of Spitzbergen.

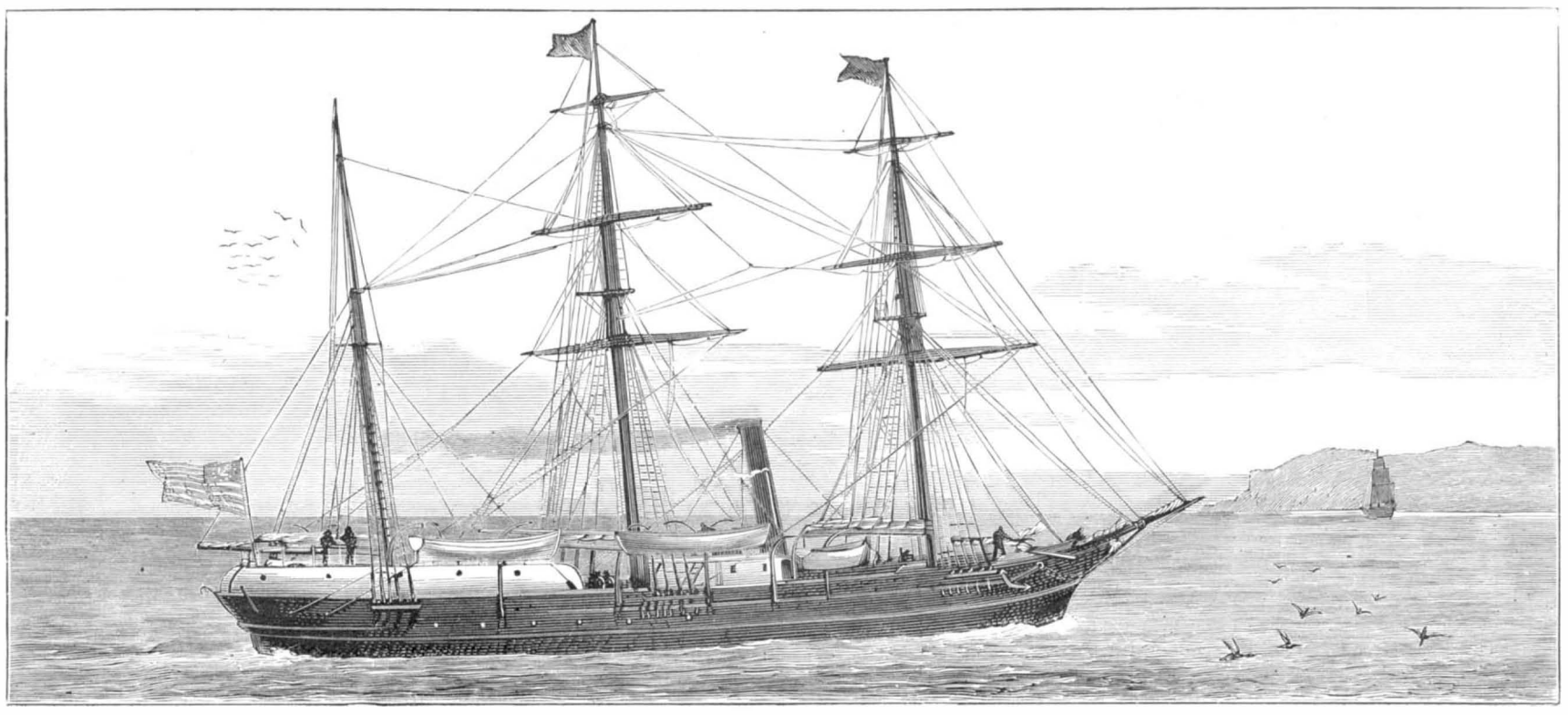
The map of the North Polar region needs little explanation, as it shows the most northerly points which as yet have been reached by the various explorers. The first really authentic Polar expedition was undertaken by Sebastian Cabot, in 1497, with three vessels; and he was succeeded in 1596 by Barents, who discovered Spitzbergen. Hudson and other Englishmen followed up his researches for the next ten years; and, in 1616, Baffin discovered the bay which bears his name, and the now well known Straits of Smith's Sound. In 1740, a Danish navigator in the Russian service, Behring, passed through the straits which separate Asia from the United States. These discoveries, which were mainly made while searching for the Northwest Passage, by which the Atlantic and Pacific were supposed to be united, early proved of great value to Arctic navigators, as they opened the three chief roads towards the North Pole, namely, those of Smith's Sound, of Spitzbergen, and of Behring Straits. By the first named several noteworthy attempts have been made to reach the North Pole, beginning with that of John Davis in 1585, when the latitude of Upernavik was attained, down to later days, when Ross and Parry made their well known expedition in the Alexander and the Isabella. In 1852 Inglefield attained the altitude of 78° 28′; and in the following year the American explorer, Dr. Kane, in the Advance, reached the latitude of 78° 45′, and, being forced to pass a second winter in the ice, he sent out a sledge expedition under Lieutenant Morton, who reached 81° 20′, from which point an open sea was descried. In 1860 another American, Dr. Hayes, who had served as a surgeon under Kane, sailed in a little vessel of some 133 tons, the United States, and reached 81° 35′ by means of sledges; but found Kane's "open sea" covered with ice. In 1871 Captain Hall left New York in the Polaris, and reached the highest altitude as yet attained by a vessel, namely, 82° 16′; and next we come to the Nares-Markham expedition in 1875, when Captain Markham, in a sledge journey, reached the highest altitude yet recorded—83° 26′.

The Spitzbergen route will be ever famous by the Franklin-Parry Expedition of 1827, when the altitude of 82° 45′ was attained, this being the first occasion on which sledges were used by Arctic explorers. In 1868 Dr. Petermann sent Koldewey northwards, when he attained to 81° 5′; and in 1869 Hegeman and Koldewey, in the Germania and Hansa, reached, in the former vessel, 75° 30′. In 1872 Count Wilczek fitted out the Tegethoff, and intrusted an expedition to the two Austrian explorers, Weyprecht and Payer, who, by means of sledges, reached 82° 5′ (the Tegethoff only attained 79° 54′), and discovered Franz-Josef Land. The Behring Straits have been principally explored by Russian expeditions, including those of Anjou and of Wrangell in 1821; but, in 1849, Kellett discovered "Kellett Land" and "Herald Island," since which time no expedition has attempted this route, which is now to be explored by the Jeannette. As may be seen by the map, the current in the straits sets northward, toward the Pole, while in Smith's Sound it flows in a southerly direction. Thus, a vessel entering Behring Straits would be assisted on its way by the course of the current, while all vessels going by the Baffin's Bay route lose half their time in combating the stream. The Arctic winds which mainly prevail blow from the northwest, and they cause the floating masses to drive toward the east, and thus open channels on the shores of the Arctic peninsula. A way, therefore, is expected to exist along the coast of Kellett Land, by means of which it is hoped that the Jeannette will attain her object. The fact that extremely thin and fragile ice exists in this direction, and that an open sea has been seen by Anjou, Wrangell, and Kellett, tends to corroborate the theory of the advantages to be attained by the choice of this route.

A New Steamship.

The City of Columbus is an addition to the fleet of the Ocean Steamship Line, of Savannah, and recently sailed on her first trip from this port. Both hull and engines were constructed by John Roach & Son, and are similar to those of the City of Macon and City of Savannah of the same line. A fourth vessel, the Gate City, of same capacity and power, will be ready for sea in a few days.

The principal dimensions of the City of Columbus are the following: Length 275 feet, beam 38 feet, depth 26 feet, burden 2,000 tons, Custom House register. There are three decks, exclusive of the hurricane, the main deck being of iron covered with wood. The vessel was built under the special survey of the French Bureau Veritas and the American Shipmasters' Association. The main saloon is commodious, and, like the other new steamships of this line, is superbly finished in hard polished woods. The propelling machinery consists of compound engines of 1,500 horse power. The high pressure cylinder is 38 inches, low pressure cylinder 68 inches in diameter. The surface condenser has 2,800 square feet of condensing surface. Length of connecting rod 10 feet 6 inches, diameter at middle 7½ inches, diameter of crank shaft 13 inches, diameter of line shaft 12½ inches, diameter of propeller shaft 14 inches. The boilers are four in number, of the circular tubular type; diameter of shell 12 feet 8 inches, length of shell 10 feet 6 inches. Tubes 3¼ inches outside diameter, length 7 feet 10 inches, 199 in number. There are three furnaces in each



BENNETT'S YACHT JEANNETTE FOR THE AMERICAN ARCTIC EXPEDITION.

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boiler, 3 feet 2 inches in diameter, grate bar 6 feet 6 inches long; grate surface is 252 square feet. Heating surface is 6,850 square feet. Thickness of iron plates of shell ⅞ inch; of furnaces ½ inch; of tube sheets 11/16 inch; of all other parts 9/16 inch. The longitudinal braces are 1⅞ inch diameter.

Average number of revolutions per minute 62. Speed 12½ knots per hour. Pressure 80 lbs. per square inch.

Our Enormous Consumption of Timber.

In pleading for the protection and perpetuation of forests, the *Lumberman's Gazette* gives some interesting particulars of the amount of timber consumed every year in this country. "We have now," it says, "about 90,000 miles of railroad; the annual consumption for ties or sleepers alone is 40,000,000, or thirty years' growth of 75,000 acres. To fence these roads would require at least 130,000 miles of fence, which would cost $45,000,000 to build, and take at least $15,000,000 annually to keep in repair. We have 75,000 miles of wire, which requires in its putting up 800,000 trees, while the annual repairs must take 300,000 more. The little, insignificant lucifer match consumes annually in its manufacture 300,000 cubic feet of the finest pine. The bricks that are annually baked require 2.000.000 cords of wood, which would sweep the timber clean from 50,000 acres. Shoe pegs are quite as important an article as matches or bricks, and to make the required annual supply consumes 100,000 cords of fine timber, while the manufacture of lasts and boot trees takes 500,000 cords of maple, beech, and birch, and about the same amount is required for plane stocks and the handles of tools. The packing boxes made in the United States in 1874 amounted to $12,000,000, while the timber manufactured into agricultural implements, wagons, etc., is more than $100,000,000. The farm and rural fences of the country consume an immense amount of lumber and timber annually, but as we grow older as a nation, this consumption may, and probably will, be reduced by the more general use of live fences or hedges. Our consumption of timber is not only daily on the increase, but our exportation of timber is also rapidly increasing. Our staves go by the million to France annually, walnut, oak, maple and pine to England, and spars and docking timber to China and Japan."

The Growth of Texas.

Ex-Governor Pease, of Texas, asserts that immigration has done more for Texas, within the past eight or ten years, than it has done for any other State; and a notable feature of this growth is the circumstance that the immigrants have come, not, to any considerable extent, from Europe, but from other States in the Union. During the six or seven years immediately following the war, tens of thousands of people who were born and had always lived in Mississippi, Alabama, Louisiana, Georgia, South Carolina, and other Southern States—but especially Mississippi—finding themselves seemingly ruined at home, migrated in crowds to the wider and newer fields of Texas.

The greater part of the immigration into Texas, during the last three or four years, has been, and now is, from the Northwestern States. People from Wisconsin, Iowa, Minnesota, and all that region, tired of the long, severe winters of the Northwest, are flocking southward into the more genial climate of Texas.

That great State, which is very nearly equal in geographical extent to the whole of France, with an addition equivalent to the size of New York State, can support a population equal to the last census of the United States. Its division into two, three, or four States is only a question of time. It possesses in its northern part a great wheat growing region. Its western slopes and plains are finely adapted to grazing and to sheep culture. Winter pasturing is always sure. Texas has no "rainy season;" its rains are uncertain as to season, and are scattered through the year; though the supply is probably not always fully equal to the needs of the agriculturist.

Fish Culture in the Far West.

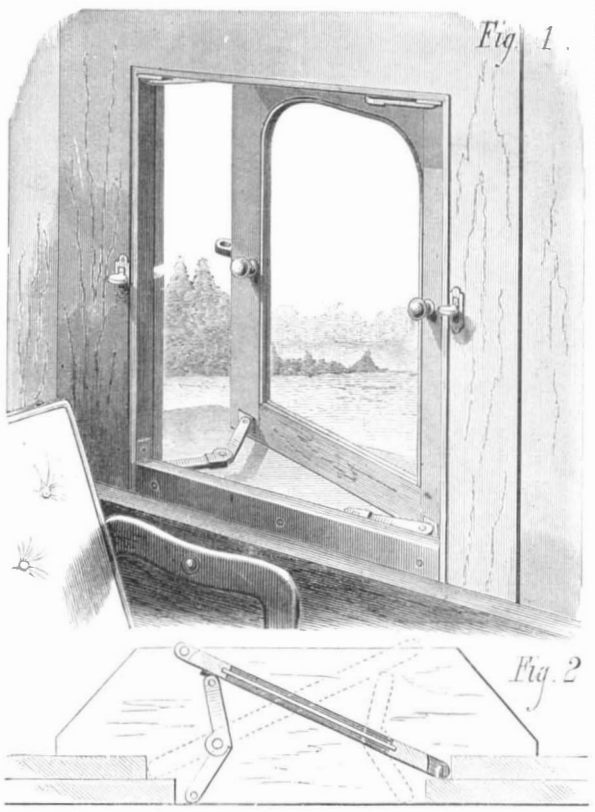
The propagation of salmon at the United States fish hatching establishment on the McCloud River promises well. It is said that the run of fish is plentiful, and preparations have been made for securing 12,000,000 eggs. The catfish placed in the Sacramento some years ago are doing well. No further distribution of catfish will be made by the commissioners, as they think the supply already distributed will be sufficient for the State. It is said that shad are becoming abundant. The commissioners expect to receive a supply of superior carp from the Government some time this year. Fish Commissioner Parker, of Nevada, has obtained 2,500 catfish to stock the Humboldt River. Nevada also receives this year 500,000 salmon, to be placed in the Truckee River, so that they can go to Pyramid Lake. The California commissioners will get 2,500,000 young salmon this year to replenish the stock in the Pitt, McCloud, and Sacramento rivers.

Steel Tow Lines.

The Cleveland *Plaindealer* says that steel tow lines are becoming popular on the lakes. They are found to work well. Of a line recently imported the *Plaindealer* says: "It is 660 feet long and weighs less than 800 lbs.; is made of the best crucible steel, at the same factory that supplies the British navy. It left Liverpool sixteen days ago, was imported and fitted by Messrs. Upson, Walton & Co. for the owner, Mr. R. K. Winslow, and is now on its way to Lake Superior. This may be considered quick work."

A NOVEL RAILWAY CAR WINDOW.

Every traveler knows too well the discomfort of dust and cinders which with the present ventilating devices seek an entrance to the car with every fresh breath of air. The problem of avoiding this annoyance without obstructing the view from the car window has been solved by Mr. C. T. Deblois, of 51 Dwight street, Boston, Mass., who patented April 30th, 1878, the device shown in the accompanying engraving, Fig. 1 being a perspective view, and Fig. 2 a horizontal section showing the arrangement of the hinges.



A NOVEL RAILWAY CAR WINDOW.

The invention consists in a novel arrangement by which a car window of any size now in use on ordinary or palace cars may open outward diagonally from either side according to the direction of movement of the train, thereby effectually preventing the annoyance from cinders, smoke, and dust. A simple hinge at the top and bottom of each side of the sash connects it with the window frame, the hinges being so arranged as to allow the window to swing outward from either side. In addition to this support each side of the sash is provided with an ear having a hole to receive a pintle, or equivalent, connecting with a thumb piece on the inside of the car. When both pintles are in the eyes both sides of the sash are firmly closed. By removing either pintle or by lifting the thumb piece, the other pintle serves as a pivotal point for the sash, and it is obvious by lifting the rear thumb piece the sash from that side may be thrown outward, and a window so held and supported at each side may open to the right or left according to the direction of movement of the car, for purposes of ventilation, without at all obstructing the view. A projecting "cap" at the top and a similar projection or shelf at the sash make, when the window is open, a complete inclosure from cinders, smoke, and dust. The necessary expense of windows with this improvement is but little if any more than for those now in use, which fact recommends it to the managers of railroads as well worthy of their consideration and approval. For further particulars address the inventor.

NEW COFFEE POT.

The making of a really good cup of coffee is an art which

NEW COFFEE POT.

comparatively few have acquired. While it occasionally happens that a good cup is produced by the ordinary methods, it only happens, and is the exception rather than the rule. To render the process positive, and to insure a uniformly good product, Mr. A. B. Place, of Denver, Col., has devised the coffee pot shown in the accompanying illustration.

The exterior portion of the coffee pot is of the usual form. A vessel, A, having a conical bottom, perforated sides, and a flaring top, is fitted to the outer portion of the coffee pot, and contains a wire gauze or perforated sheet metal vessel, B, which is flanged and supported by a ledge in the vessel, A.

The central portion of the vessel, B, extends to the cover of the coffee pot, and a tube extends upward from the conical bottom of the vessel, A, into the central opening of the vessel, B.

The parts being in the position shown in the cut, the ground coffee is placed in the vessel, B, boiling water is poured through the central opening of the vessel, B, in the desired quantity, and the apparatus is placed over the fire, and the water allowed to boil a few minutes. As the water boils the conical shape of the chamber at the bottom of the coffee pot causes the water to rise through the central opening of the vessel, B, and a current is established which extends through the coffee in the vessel, B, and quickly extracts the strength therefrom. Any fine grounds which may be forced out through the perforations in the vessel, B, will fall into and be arrested by the annular trough in the bottom of the vessel, A, where they are retained. If desired, the cup or vessel, B, may be removed after the strength is extracted from the coffee, leaving only the liquid coffee remaining in the apparatus.

For further information address the inventor as above.

Important Use of Natural Gas.

The petroleum product of Pennsylvania now reaches the fabulous sum of eighty millions of dollars per year, while the exportation runs to about sixty millions. Until recently, or at least within a few years, but little use has been made of the natural gas which has discharged into either the open air or been burned in huge torch lights through the oil regions. In Beaver Falls, a manufacturing town of considerable note, located about thirty miles west of Pittsburg on the Fort Wayne and Chicago Railroad, one well was put down about sixteen years ago for oil, and struck gas at about 1,100 feet in depth, whence it poured continuously until about two years ago, when it was leased, cased up, and brought into use. This induced the Harmony Society to put down more wells in different localities (five in number), all of which give out liberal supplies, some as high as one hundred thousand feet every twenty-four hours, which is now being used in nearly every manufacturing establishment in the town. About one half of the gas used for lighting the town comes from these wells; it is also used under the gas retorts for heating (five in number). The large cutlery works use it in 49 heating furnaces; the hinge works, in three large heating furnaces; the pottery works, in two large kilns and two very large furnaces for drying ware; the shovel works, in one large heating furnace; the file works, in seven large annealing furnaces; the saw works, in one very large heating furnace, 14 feet long by 11½ feet wide, which is run to a very high heat. It is also used in one forging furnace. Two drying kilns for seasoning lumber use it. And it is also introduced into dwelling houses, heating furnaces, and stoves and cooking stoves, and is exclusively used direct from the wells for lighting one large dwelling. Other wells are now going down, and everything indicates the exclusive use of this gas for all heating, illuminating, and manufacturing purposes. Its value is really incalculable in working steel. It is said to be fully equal to charcoal, if not superior, there being no base substance like sulphur or other matters so damaging to its quality. A remarkable feature about it is, that men work right along in a room filled with it, take it freely into their lungs, in short, breathe it as they do air; and it appears rather healthful than otherwise, while manufactured gas is actually dangerous to inhale. The flame is clear white and gives an intense heat with very little smoke. There seems no diminution in the supply; there may be a limit to the supply, but the gas is in all probability being constantly produced down deep in the earth.

J. E. EMERSON.

Large Shipments of Cheese and Meat.

The cheese shipments by steamer for Europe, from this port, August 24, exceeded anything before made in one day, the total amount being 68,500 boxes. The steamship Devon, of the Great Western Line, for Bristol, carried 7,000 boxes of cheese, 200 sheep and 50 head of cattle; the Germanic, of the White Star Line, for Liverpool, had 33,500 boxes of cheese and 200 tons of fresh meat; the Bolivia carried to Glasgow 15,000 boxes of cheese and 800 quarters of fresh meat, and the Helvetia, of the National Line, for Liverpool, took 13,000 boxes of cheese and 45 tons of fresh meat.

American Paper for Export.

Holyoke manufacturers report a steady growth of export trade in American papers. The export of the country has risen from $491,000 in 1871 and $856,000 in 1876–77 to over a million in 1877–78. It is said that the ability of American manufacturers to compete in price with those of Europe is largely due to the fall in the price of rags, brought about by the large use of wood pulp.

PRIMARY instruction is indispensable; it is the fruitful mother of manual labor as well as of arts and industry; it alone frees men from the gloom of superstition, helps them to understand their duties as sons, fathers, and citizens, and enables them to render themselves worthy of liberty.—*E. Ogier.*

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LESCALE'S AUTOMATIC FIRE ESCAPE.

Among the things most required in these days of tall buildings and narrow places of entrance and exit, are means of escape in case of fire for those who occupy the upper apartments. Apparatus for this purpose should be compact, portable, and yet strong and reliable. To embody these qualities in a single device has been the aim of Mr. John M. Lescale, whose fire escape is shown in the accompanying engraving.

The iron frame, A, which supports the several parts of the machine is secured in a washstand or some other suitable piece of furniture, which is placed upon casters, and made of sufficient weight and strength to suit the purpose. A double drum, B, is journaled to the frame, A, and two ropes, rope ladders, or chains are attached thereto, one in each groove of the drum. To these ropes or chains adjustable seats are suspended by means of hooks.

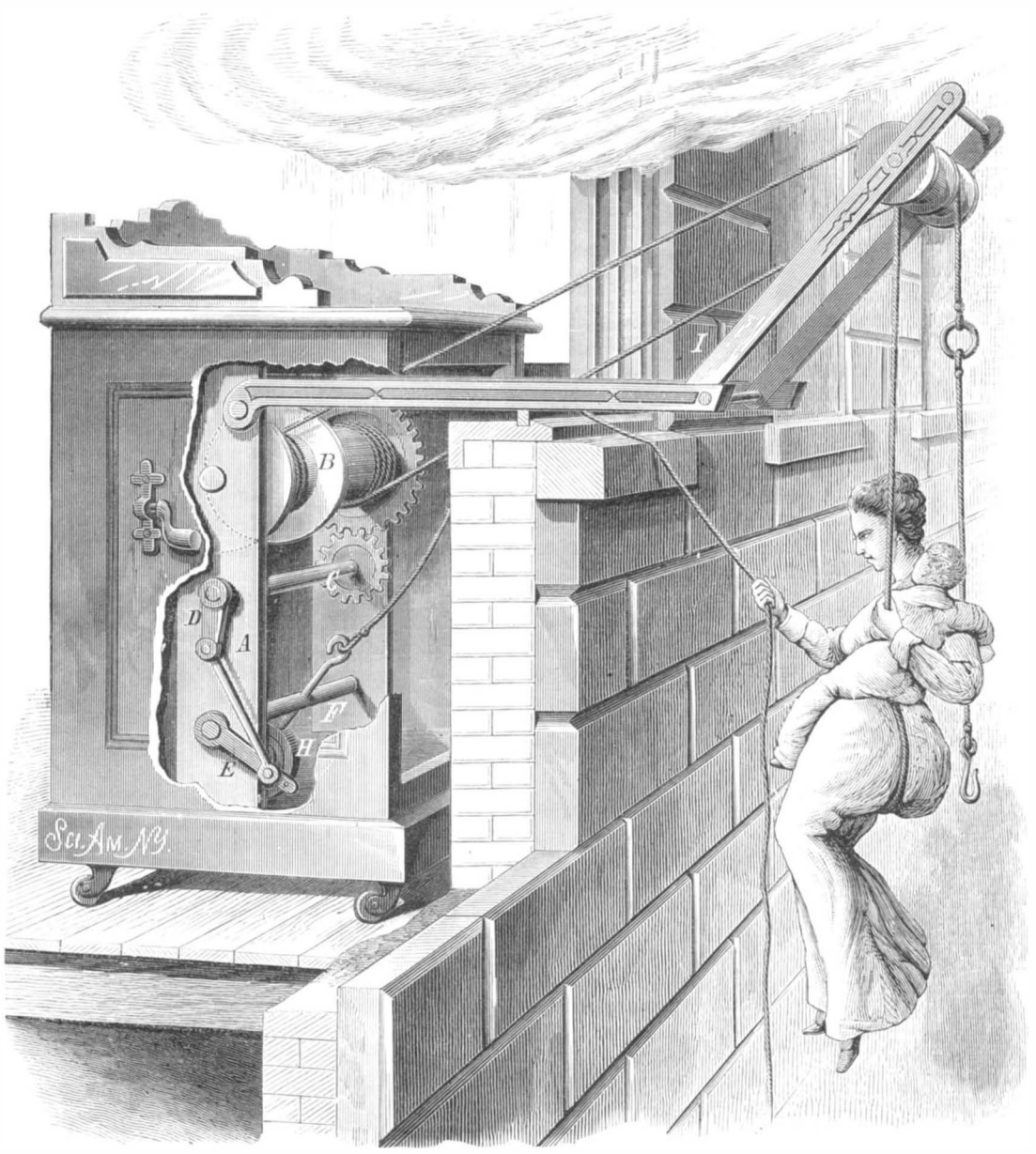
When the drum, B, is revolved it imparts through the medium of the gear wheels an increased motion to the shaft, C, which, in turn, by means of the cranks, D and E, of unequal radius, imparts a rocking motion to the shaft, F, that carries the pendulum or weight, H, which may be screwed up or down on the rod to regulate the rotary motion of the drum, D Screwing up the weight toward the shaft, F, will permit the drum, B, to run with an increased velocity; screwing the weight down produces the opposite effect. By means of this device the apparatus may be adjusted to any weight that is to be put upon the ropes or chains.

A jointed folding frame, I, is hinged to the top of the frame, A, and supports two rollers at its outer end.

In case of emergency, the washstand is rolled to some convenient place, say a window or a balcony, and if time permits, the folding frame, I, is made to project over the window sill or balcony. The end of either of the ropes wound on the drum is unhooked, and the imperiled person passes the rope first over one of the loose pulleys in the jointed frame, then passes it around his body, hooks it, and lets himself down easily and safely. By this time, if there are other inmates exposed, a second one unhooks the end of the other rope and also lowers himself to the ground, and in so doing causes the drum to wind up the first rope, ready to repeat the operation in favor of a third occupant, and so on. Every person descending winds one of the ropes on the drum, and thus prepares the machine for another. Should it be required, a rope, with a weight at one end, may be provided in the apparatus, which may be attached by one end to a hook on the pendulum rod, while the end carrying the weight is let down upon the pavement. By means of this line so connected with the pendulum rod persons descending will be enabled to check their descent, but while this may be very convenient when time enough is allowed, and order and calm prevail, yet the apparatus is so constructed that in pressing emergencies no time is required but what is strictly necessary to roll the stand to some suitable place, take hold of the end of one rope, and let one's self down, that is, a few seconds at most.

In addition to the above mentioned advantages, the apparatus herein described will be found of great service to facilitate the ascension of outsiders into buildings in conflagration, for the purpose of affording assistance, putting out fires, saving valuables, etc. It will also be found a safe and convenient auxiliary to masons engaged in erecting isolated chimneys to ascend and descend.

This invention was patented May 21, 1878, by Mr. J. M. Lascale, of Paincourtville, La., from whom further information may be obtained.



LESCALE'S AUTOMATIC FIRE ESCAPE.

New Inventions.

Mr. Richard J. McGowan, of New York city, has patented an Embalming Composition, consisting of a solution of saltpeter, thymol, chloride of aluminum, salicylic acid, and glycerin in alcohol and water.

An improved Shoe Horn has been patented by Mr. Julius Klaucke, of Solingen, Germany. This improvement consists in providing the shoe horn with a pendent rigid arm, and in hinging to said arm a toothed clamp piece and a cam lever, which is operated to cause the latter to clamp the leather tightly against the body of the shoe horn.

Mr. George J. Record, of Conneaut, Ohio, has patented an improved Cover for Butter Packages and other vessels. This invention consists in a cover formed of the two parts, having their adjacent or straight edges rounded or beveled, and the lever attached to the one part and overlapping the other part, whether the said lever be made narrow, in the form of a bar, or wide, in the form of a circle.

Mr. Samuel P. Groocock, of New York city, has patented an improved Clamp for Gluing Parquetry. This invention relates to the manufacture of sections of tessellated wood flooring; and it consists in an iron frame which is truly rectangular, and into which the several blocks composing the floor section are fitted prior to gluing, the blocks being then removed and coated upon the edges with glue, and replaced in the frame, there to remain until dry. The object of the invention is to confine the blocks so as to prevent the opening of the joints and the distortion of the section by the swelling of the wood by the absorption of moisture from the glue.

An improved Temporary Binder has been patented by John Lockhart, of Philadelphia, Pa. It consists of a cover section connected by strings with the opposite cover section, the strings being passed through holes of the same, and through centrally perforated exterior clamps of annular shape, that are notched or recessed at one point of the circumference. The strings are then wound around the clamps and passed to the inside of the cover section, where they are again wound around and retained by inner annular clamps.

Mr. James S. Mercer, of New York city, has patented an improved Sponge Holder for Mucilage, French dressing, and other bottles, by which the sponge or other porous material is held firmly in the neck of the bottle, while it may also be readily removed therefrom, if desired, either for refilling the bottle or replacing the sponge.

Mr. John P. Spiss, of Fairview, Ill., has patented an improved Hanger for Supporting the Eaves troughs or gutters of roofs of all kinds in a simple, cheap, and durable manner; and the invention consists in the connection of the supporting hangers with a cornice attached below the eaves of the roof, and riveted to encircling bands of the trough or gutter proper.

An improved Bung has been patented by Anton Schneider, of New York city. This invention consists in a thimble provided with vertical inside grooves, and inclines and stops on its lower end surface, in combination with a cap provided with a turnable central bolt having a crosshead, and with suitable packing rings; and in the combination, with the thimble and cap, of a packing ring provided at intervals with bosses or raised portions.

Mr. John Q. Adams, of Brooklyn, N. Y., has patented an improved Waste Pipe Valve. The object of this invention is to furnish an improved means for preventing sewer gas from passing into the room through the waste pipes of washbasins, bath tubs, privy basins, etc.

Mr. Louis S. Flatau, of Pittsburg, Texas, has patented an improved Hame Fastening, which is easily attachable to the hames and not liable to be detached by accident. The invention consists in the combination, with the slotted metallic hame straps, of a double recessed lever hook of peculiar construction.

Mr. Richard D. Ryerson, of Clinton, Me., has patented an improved Stove Leg, which is so constructed that it may be conveniently lengthened and shortened, to level the stove, to raise or lower it, to enable a carpet to be put under or removed from under the stove. It may be provided with casters to enable the stove to be readily moved from place to place.

Mr. James S. Morel, of Savannah, Ga., has patented an improved Glove Electrode, which is particularly intended for use in the healing art; and it consists essentially in a novel mode of connecting a magneto-electric current with a glove to be worn on the hand, and in certain details of construction and arrangement of devices employed in forming the connection, whereby provision is made for applying such current to any portion of the body of a patient which can be reached by the hand of either the patient individually or the medical or other attendant.

Mr. William Manley, of Rochester, N. Y., is the inventor of an improved Machine by which the Seam of Boots and Shoes may be divided and rubbed down evenly and smoothly in a very short time with a small amount of labor.

Mr. Marciene H. Whitcomb and John Bliss, of Holyoke, Mass, have patented an improved Stripping Attachment to Wool-carding Machines, by which a positive and perfectly sure stripping of the sliver is obtained in such a manner that it does away with the rattling, noisy combs, and the liability of damage which always attends their use.

Mr. Stephen W. Cornell, of Pleasantville, N. Y., has patented an improved Portable Screen for coal, sand, gravel, and other purposes, that is capable of being adjusted to any desired inclination, and also of being conveniently moved to any place in the yard; and the invention consists of a wire screen that is supported at any inclination on a forked rod, which is connected by a clamp and pivot joint to the screen, so as to be folded below the same when it is desired to be moved on its side wheels.

Mr. Andrew Johnson, of Kewanee, Ill., is the inventor of an improved Device by which Wall Paper may be Hung by unskilled persons quickly and easily, and with less trouble of wrinkling than it is done by hand, while also saving the trouble of getting on chairs or step ladders.

Mr. Harry C. Mann, of Philadelphia, Pa., has patented an Egg Beater, which is so constructed as to beat the eggs rapidly and thoroughly, and without throwing them out of the dish.

An improved Trunk has been patented by Mr. J. W. Henry, of Jamestown, Ind. The object of this invention is to improve the construction of trunks in such a way that the tray can be swung out to give convenient access to the interior of the trunk body with the greatest ease, even when filled, and without changing it from a level, and without disturbing its contents in the least.

Mr. Jacob M. Baum, of Selin's Grove, Pa., has patented an improved Tobacco Pipe, which consists of a cover or lid being attached to the rim of the pipe by a rear and front hook entering a rear socket hole and front groove below the rim. The lid is perforated, and has a central top slot, with hinged inner friction plate and outer auxiliary lid.

Mr. Daniel Fisher, of Cairo, Pa., is the inventor of an improved Fishway, which consists in a trunk or chute provided with dams or ledges, placed alternately at the sides of the chute, to check the current and form a sinuous passage for the water, whereby a channel is made for the fish to pass up or down; and the shape of the ledges is such that a wider channel is allowed in proportion to the depth of water.

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Professor Sumner on the Times.

A refreshing change came over the work of the Congressional Labor Committee when Professor Sumner, of Yale College, was called to give his views with regard to the financial and industrial condition of the country. Up to that time the witnesses had chiefly been men of very limited knowledge, backed by limitless assurance. Professor Sumner did not pretend to know everything, nor to have an infallible specific for all labor troubles, real or imaginary. On the contrary, the years of candid study he had given to the relations of capital and labor in this country had taught him how very meager and unsatisfactory are the means for forming decided conclusions in regard to the matter. He must be a very bold man, the Professor said, who would claim that he had solved this problem. Great industrial revolutions have taken place all over the world during the past ten or fifteen years, and this country has had its share. And local causes have intensified the effects produced by general causes the world over. The professional political economist would be very timid about his own conclusions in regard to either causes or cures. The Suez Canal, the Pacific railroads, the cable telegraphs, and other agencies of speedy communication have revolutionized commerce. Stocks of goods are now telegraphed for, where formerly orders were given by ship communication. In former times the merchant had to carry a large stock of goods, enough to meet several months' demand. Now he can replenish his stock, by telegraph and steam, promptly and surely, and is thus enabled to get along with a minimum supply. The immediate and temporary effect has been an oversupply of goods, and consequently a glut of capital. But this derangement of trade could not last long; people would soon get accustomed to the new order of things, and the ultimate effect would be a great improvement in the condition of the laboring classes.

Thus, when the Suez Canal was completed, it was thought to be a failure, because the immense stock of goods which was immediately accumulated caused a glut, this glut a crisis, and then a reaction set in naturally, which checked business through the canal. But as soon as the goods that had accumulated were worked off, things adjusted themselves, and the Suez Canal business soon recovered. The increased movement of productions brought about by the opening of the canal must result in a very great improvement, and in a great development of the well being of all classes.

So in like manner it has been with machinery. Its first effect naturally is to destroy wealth, displace labor, and lock up capital. For example, the building of railroads had, as a matter of necessity, displaced stage coaches, etc., and thrown the men employed in that business out of work. It was the same with the introduction of the loom, and, indeed, wherever machinery has been employed. This, undoubtedly, caused a temporary irksome distress, but it is the penalty society has to pay for its gains. Ultimately society, which includes everybody, is benefited by the use of machinery. A century ago an agricultural laborer, or one of the operative class, lived in one or two rooms, with no sanitary comforts, no good means of lighting, cooking, etc. To-day he has more rooms, perhaps a whole house, with carpets, furniture, reading matter, good clothes for himself and wife, and good light for his dwelling. This is the effect of machinery, which has cheapened luxuries and brought them within the reach of those who a century ago could not aspire to them. There are people to-day in the United States whose fathers were displaced in the old country by machinery. Their fathers suffered poverty and were forced to emigrate. They came here and prospered, and their children must look upon the distress which drove them to this country as a family blessing. The temporary distress due to progress is unavoidable. What we call civilization has come to us through the struggles of generations of men. Machinery is only the modern form of its development.

Our own war and the consequent public debt; the Franco-German war, and the extravagance and speculation engendered in Germany by the receipt of the French indemnity, were mentioned as among the general causes of the recent commercial and industrial depression.

As for a remedy, the Professor had none to suggest, certainly none that legislation could furnish. We must each work through the period and do the best he can. A part of the cure would come through the redistribution of labor; but that could not be undertaken by Congress without doing a great deal of mischief. To attempt a redistribution of wealth by legislation would be infinitely worse. Each man gets just what comes to him by industry, ability, education, energy, and self-denial. Society owes no man a living. The fact that he is here does not prove that society must support him. Every man must fight his own battle with nature. Were government to interfere to see that every man gets a living, except by his own industry and thrift, it would end by making us a nation of paupers.

In this hasty summary we have barely touched upon the salient points of Professor Sumner's testimony. Possibly we may have failed to do him full justice. If so it must be charged to lack of space, not to any lack of sympathy with his views, broadly considered.

American Diamond Cutting.

In an article on the diamonds of South Africa in *Scribner's Magazine*, Dr. Morton says that the cleaning, cutting, and polishing of the rough stone can now be done as well here as abroad, or (as I believe, judging by results and from the testimony of experts) better. Stones cut in Europe are frequently remodeled and repolished in this country, thereby gaining much in value, and others abandoned in the rough as not worth cutting are here converted into excellent brilliants. The credit for introducing this industry is due to Mr. Henry Morse, of Boston, and Mr. Hermann, of New York, who yet remain the only competitors.

THE MICRO-TELEPHONE.

BY GEO. M. HOPKINS.

The Edison carbon telephone and the instrument known as Hughes' microphone, which according to general belief

Fig. 1.

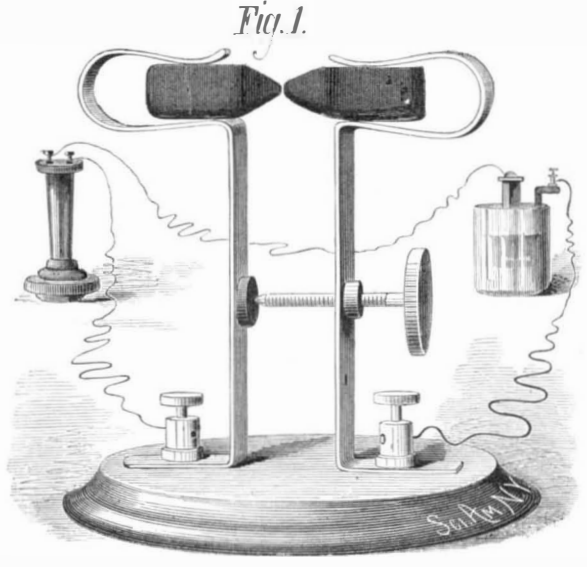

Fig. 1.—A NEW MICRO-TELEPHONE.

are identical as to principle, depend, according to the inventor's theory, upon the changing conductivity of carbon under a varying pressure. It has been generally admitted that no instrument that would make and break the electric current could transmit articulate sounds. Nor has such an instrument to my knowledge been produced prior to the one shown in the accompanying engravings. My instrument, so far as I know, differs materially from the multitude of other forms of telephone or microphone, which are all based upon the principle discovered by Edison.

Fig. 2.

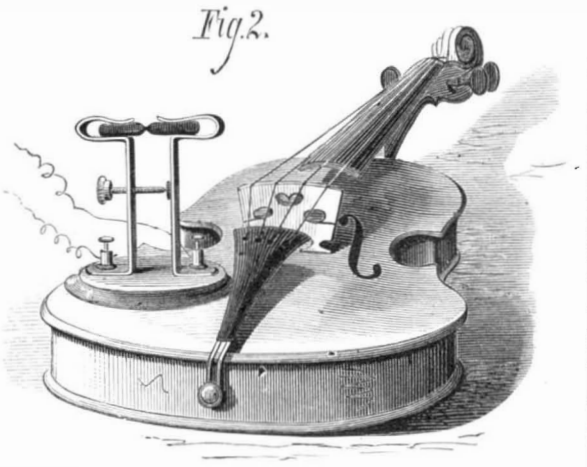

Fig. 2.—MICRO-TELEPHONE ON A VIOLIN.

The instrument which is the subject of this article consists essentially of two springs secured to a small base piece, and each supporting at their upper end a piece of ordinary battery carbon. These two pieces of carbon are placed in light contact, and the two springs are put in an electrical circuit in which there is also a receiving telephone of the Bell form.

Fig. 3.

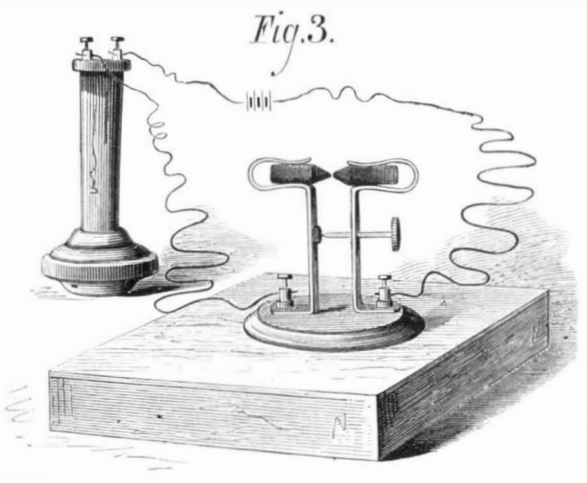

Fig. 3.—MICRO-TELEPHONE ON A PLAIN SOUNDING BOARD.

This instrument is represented full size, in detail, in Fig. 1. In Fig. 2 the micro-telephone is placed upon a violin. In Figs. 3 and 4 it is secured to a small sounding board. The two carbon supporting springs are fastened to a single base by the binding posts which receive the battery wires. An adjusting screw passes through one of the springs at or near its center, and bears against a rubber button projecting from the other spring. This simple device when placed on a table indicates in the receiving telephone the slightest touch of the finger on the table or on the instrument. Blowing on it makes in the receiving instrument a deafening roar; drawing a hair or a bit of cotton across the carbon is distinctly audible in the receiving instrument.

When the device is placed on a small sounding board every sound in the room is received and transmitted. An ant running across the sounding board can be plainly heard. And a touch upon the instrument or the table which supports it, which without the micro-telephone would be entirely inaudible, can be distinctly heard in the receiving telephone by aid of the instrument, even though miles intervene.

When it is placed on a violin, as in Fig. 2, blowing lightly upon the strings produces Æolian harp tones in the receiver, and a song sung to the violin is rendered in the receiving instrument with an Æolian harp accompaniment. When mounted on a violin or sounding board it will transmit articulate speech uttered in any portion of a room of ordinary size; it will receive and transmit the music of a piano, and even the turning of the music may be heard. Whistling, flute music, and other sounds are transmitted with their characteristics of volume, pitch, and timbre.

Fig. 4.

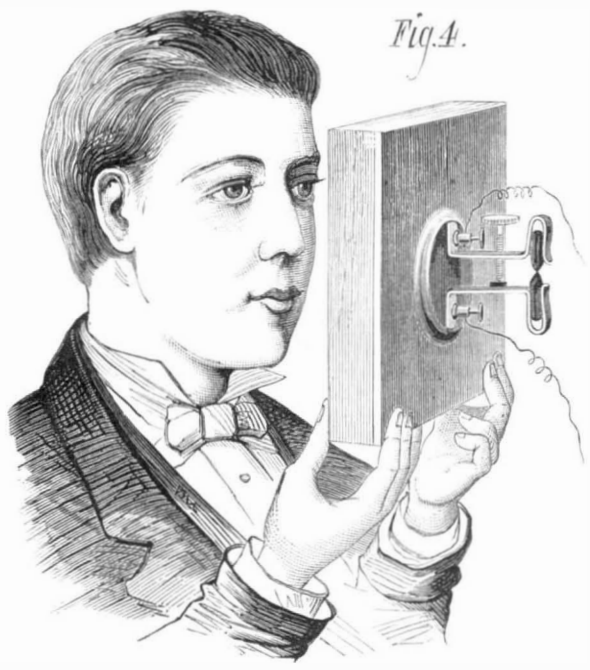

Fig. 4.—MICRO-TELEPHONE USED AS A TELEPHONE.

This instrument, although so very simple, is capable of doing all that has been done by other instruments of an analogous character, and it will be determined by further experiment whether it will do more.

Although carbon contact points are preferable, they are not absolutely essential to the operation of the instrument, as metallic points will do the same things, but not so satisfactorily.

ASTRONOMICAL NOTES

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, September 14, 1878.

The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated.

PLANETS

	H.M.		H.M.
Venus rises	3 57 mo.	Uranus rises	3 59 mo.
Jupiter in meridian	8 23 eve.	Neptune rises	8 08 eve.
Saturn in meridian	0 32 mo.	Neptune in meridian	2 58 mo.

FIRST MAGNITUDE STARS, ETC.

	H.M.		H.M.
Alpheratz in meridian	0 30 mo.	Procyon rises	1 41 mo.
Mira (var.) rises	8 50 eve.	Regulus rises	3 45 mo.
Algol (var.) in meridian	3 27 mo.	Spica	invisible
7 stars (Pleiades) rise	8 36 eve.	Arcturus sets	9 47 eve.
Aldebaran rises	9 55 eve.	Antares sets	9 06 eve.
Capella rises	7 22 eve.	Vega in meridian	6 58 eve.
Rigel rises	0 05 mo.	Altair in meridian	8 09 eve.
Betelgeuse rises	11 47 eve.	Deneb in meridian	9 02 eve.
Sirius rises	2 07 mo.	Fomalhaut in meridian	11 15 eve.

REMARKS.

Venus arrives at perihelion September 19. Mars will be in conjunction with the sun September 18, and after that date will be a morning star, rising before the sun. Algol will be at minimum brilliancy September 20, 4h. 42m.

The zodiacal constellations now visible in the early evening are Libra, the scales, Scorpio, the scorpion, Sagittarius, the archer, Capricornus, the goat, and Aquarius, the water-bearer, mentioned in their order of succession from west to east. The moon is nearest Aldebaran September 17, being about 10° north.

The Speed of Rarus.

At Charter Oak Park, Hartford, Conn., Aug. 23, the fast trotter Rarus made the three best consecutive mile heats on record. Time: First mile, 2:15; second, 2:13½; third, 2:13¾. His fastest gait for a single quarter was at the rate of 2:10. The best time made by the same horse at Buffalo was 2:13¼.

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Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Vertical Engines, 10 to 15 H. P., thoroughly well made. John Hartrick & Co., 47 Gold street, New York.

Use the Patent Improved Sheet Iron Roofing and Drip Crimped Siding made by A. Northrup & Co., Pittsburg, Pa. Send for circular and prices.

ForPower&Economy,Alcott's Turbine,Mt.Holly,N.J.

Wanted—Band Saw Blades, also Band Saw Setter. Send prices to C. A. Walker, Kenton, O.

Large Magic Lantern and 60 Views only $25. Catalogue free. Outfits wanted. Theo. J. Harbach, Importer and Manufacturer, 809 Filbert St., Phila.

Engine Builders' Brass Goods, Oil Feeders, Glass Oil Cups, Shaft Cups. All goods strictly first class. Address Cincinnati Brass Works.

Yacht Machinery Complete, 10 horse power, little used, or will trade for sail yacht. Thos. Hopewell, 27 Potter St., Hartford, Conn.

Dead Pulleys, that stop the running of Loose Pulleys and Belts, taking the strain from Line Shaft when Machine is not in use. Taper Sleeve Pulley Works, Erie,Pa.

Nickel Plating.—A white deposit guaranteed by using our material. Condit,Hanson & Van Winkle,Newark,N.J. English Agency, 18 Caroline St., Birmingham,

A. L. Jones' Self-Regulating Steam Trap. Most reliable one made. W. E. Kelly & Bro., General Agents, 46 Cortlandt St., New York.

Magneto Call Bells for Telephone Lines. The Best. No battery required. Bunnell, 112 Liberty street, N. Y.

Write to E. & F. Gleason, 56 Canal street, Philadelphia, for standard wood tools,

Sperm Oil, Pure. Wm. F. Nye, New Bedford, Mass.

Power & Foot Presses, Ferracute Co., Bridgeton. N. J.

North's Lathe Dog. 347 N. 4th St., Philadelphia, Pa.

Boilers & Engines cheap. Lovegrove & Co., Phila.,Pa.

Band Saws a specialty, F. H. Clement, Rochester, N.Y.

Telephones.—J.H.Bunnell, 112 Liberty St., New York.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsaith & Co., Manchester, N. H.

Pulverizing Mills for all hard substance and grinding purposes. Walker Bros. & Co., 23d and Wood St., Phila.

National Steam Pump. Simple, reliable, and durable. Send for catalogue. 46 Cortlandt St., New York.

J. C. Hoadley, Consulting Engineer and Mechanical and Scientific Expert, Lawrence, Mass.

Boilers ready for shipment, new and 2d hand. For a good boiler, send to Hilles & Jones, Wilmington, Del.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See ad. back page.

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsaith & Co., Manchester, N. H.

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn N. Y., and Paris Exposition, 1878.

Manufacturers of Improved Goods who desire to build up a lucrative foreign trade, will do well to insert a well displayed advertisement in the SCIENTIFIC AMERICAN Export Edition. This paper has a very large foreign circulation.

Alcott's Turbine received the Centennial Medal.

Bound Volumes of the Scientific American.—I will sell bound volumes 4, 10, 11, 12, 13, 16, 28, and 32, New Series, for $1 each, to be sent by express. Address John Edwards, P. O. Box 773, New York.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

Kreider, Campbell & Co., 1030 Germantown Ave., Phila., Pa., contractors for mills for all kinds of grinding.

The SCIENTIFIC AMERICAN Export Edition is published monthly, about the 15th of each month. Every number comprises most of the plates of the four preceding weekly numbers of the SCIENTIFIC AMERICAN, with other appropriate contents, business announcements, etc. It forms a large and splendid periodical of nearly one hundred quarto pages, each number illustrated with about one hundred engravings. It is a complete record of American progress in the arts.

Band Saws, $100; Scroll Saws, $75; Planers, $150; Universal Wood Workers and Hand Planers, $150, and upwards. Bentel, Margedant & Co., Hamilton, Ohio.

Patent Wood-working Machinery, Band Saws, Scroll Saws,Friezers, etc. Cordesman, Egan & Co., Cincin'ti, O.

Diamond Drills, J. Dickinson, 64 Nassau St., N. Y.

Diamond Self-clamp Paper Cutter and Bookbinders' Machinery. Howard Iron Works, Buffalo, N. Y.

The only Engine in the market attached to boiler having cold bearings. F.F.& A.B.Landis, Lancaster, Pa.

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, $350. Forsaith & Co., Manchester, N. H.

Hydraulic Cylinders, Wheels, and Pinions, Machinery Castings; all kinds; strong and durable; and easily worked. Tensile strength not less than 65,000 lbs. to square in. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Improved Wood-working Machinery made by Walker Bros., 73 and 75 Laurel St., Philadelphia, Pa.

Best Turbine Water Wheel, Alcott's, Mt. Holly, N. J.

Second Hand Planer, 8′ long, 27½″ wide, 32″ high, $360, or exchange for milling machines. Hendey Machine Co., Wolcottville, Ct.

NEW BOOKS AND PUBLICATIONS.

DEPARTMENT OF THE INTERIOR: First Annual Report of the U. S. Entomological Commission. With Maps and Illustrations. Washington: Government Printing Office. 8vo. pp. 477 (292).

This volume records the first year's investigations of Messrs. Riley, Packard and Thomas, as regards the Rocky Mountain locust, its nature and habits, its habitat, and the means that have been suggested for staying its destructive attacks upon the grain fields of the West. The Commissioners have been industrious at all events, and has collected a vast amount of information. They have the satisfaction of reporting also that by their timely arrival among the people whose crops the locusts had destroyed, and by their hopeful predictions and recommendations, they were able to inspire the discouraged pioneers with new hope and confidence, and so not only stopped the abandonment of their recently conquered homes, but greatly helped to draw westward again the tide of emigration that had been stopped.

GEOLOGICAL SURVEY OF NEW JERSEY. Report on Clay Deposits, with maps. 1878. Trenton. 8vo. pp. 380.

This report contains not only a geographical and geological survey of the clay districts of New Jersey, but chapters on the composition, properties, and origin of the clays, and a review of their economical uses. As clay forms the basis of some of the great industries of New Jersey, indeed of the Union as a whole, this report has considerable industrial as well as scientific interest. The sandy clays occur in miocene strata, and the plastic clays in the lower cretaceous (lower green sand). The latter aggregate a depth of 347 feet, of which the stoneware clay bed takes 30 feet, the South Amboy fire clay bed 20 feet, sand and kaolin 10, pipeclay 10, Woodbridge fire clay bed 20, and the Raritan beds (fire clay, sandy clay, and potter's clay) 39 feet. In 1873 there were taken from these deposits 265,000 tons of fire clay and 20,000 tons of potter's clay.

ANNUAL REPORT OF THE CHIEF SIGNAL OFFICE TO THE SECRETARY OF WAR FOR THE YEAR 1877. Washington: Government Printing Office. 8vo., pp. 570. Charts, 62.

The signal service now sustains 182 stations, of which 82 make full telegraphic reports three times a day. Telegraphic reports are also received from twelve Canadian and other British American stations, and mail reports from seven Canadian and one West Indian station. A careful analysis of the daily predictions, for each district and for each month in the year 1877, shows that a trifle over 86 per cent were verified, when the predictions of the barometric pressures, temperatures, wind-directions, and the character of the weather are taken into account. The percentage of accuracy of forecast limited to the pre-announcement of the character of the weather to be expected in the districts, exclusive of the other conditions above referred to, was 90⅓ per cent. An extended report is given of the tornado that devastated Mt. Carmel, Ill., June 4, 1877.

INTERNATIONAL EXHIBITION, 1876. Reports and Awards. Groups 11, 13, 16, 19, 22. Edited by Francis A. Walker. Philadelphia: J. B. Lippincott & Co., 1877.

These reports cover, respectively, jewelry, watches, silverware, bronzes, etc.; paper industry, stationery, printing and book-making; military and sporting firearms and explosives; vessels and apparatus for transportation; machines, apparatus and implements used in sewing and making clothing, lace, etc.

RAILROADS: Their Origin and Problems. By Charles Francis Adams, Jr. New York: G. P. Putnam's Sons. 12mo., pp. 216. $1.25.

In this volume Mr. Adams first reviews the genesis of railways, depending mainly upon contemporary accounts of the opening of the pioneer railroads of this country and England, then proceeds to examine the financial, social, and industrial problems to which railways have given rise. His aim is rather to discover what these problems are than to present any plan for their solution. Seeing that they embrace not a few of the most important conditions of modern life, as well as the most complex, Mr. Adams wisely prefers to watch and wait, leaving it to a better instructed future to determine their final settlement.

RAILWAY SERVICE. I. Trains and Stations. II. Baggage Car Traffic. By Marshall M. Kirkman. Published by the *Railroad Gazette*. New York. 1878. 12mo. pp. 261 and 252. $2.

In "Trains and Stations" Mr. Kirkman has described the physical life of the railway, the composition and movement of railway trains, and the laws governing the same, with an exposition of the duties of train and station men. A chapter is given to telegraph operators and repairers; one to the regulations of the Austrian railway service, and another to the management of English roads. "Baggage Car Traffic" illustrates the customs, rules and regulations of the baggage department, and the parcel traffic of railroads in this country and in Europe.

Notes & Queries

(1) C. W. Z. asks: What are the ingredients, proportions, and complete process for manufacturing carbons for electrical apparatus? A. Fine dust of coke and coking coal is first put into a close iron mould of the shape required for the carbon, and exposed to a red heat. When cool it is taken from the mould and soaked in thick sirup and reheated. This operation is repeated until the carbon acquires the necessary solidity and conducting power.

(2) R. W. M. asks: Can I do any electroplating with seven jars Callaud battery, and how? A. Yes; see p. 209, vol. 38, SCIENTIFIC AMERICAN. For copper plating use a bath composed of pure copper sulphate dissolved in about 5 parts of water. For gold, dissolve in solution of 4 ounces of potassium cyanide in 1 gallon of water, half an ounce of gold (by battery) or 0·77 of an ounce of gold chloride—use the bath hot (about 150° Fah.); for silver, add to a strong aqueous solution of one ounce of silver nitrate potassium cyanide dissolved in a little water, until no further precipitate forms (avoid adding excess); settle, decant the supernatant liquid, wash the residue with water, dissolve it in a small quantity of strong aqueous solution of potassium cyanide, and dilute the solution to one gallon with pure water for use. For copper use a copper anode, for silver a silver anode, etc. Potassium cyanide is poisonous,

(3) J. W. asks: How and of what material is Indian ink (in blocks or sticks) made? A. Indian ink consists of finely divided carbon cemented together by certain glutinous vegetable juices, gum, gelatin, etc. The precise nature of the cement or mucilage used by the Chinese in the manufacture of their inks is not known. But the greater part of the ink now sold as Indian ink consists of fine lampblack and glue. Purify fine lampblack by washing it with a solution of caustic soda, dry, and make it into a thick paste with a weak solution of gelatin containing a few drops of musk essence and about half as much ambergris; mould and dry. Instead of gelatin the following solution may be used: seed lac, 1 oz.; borax, ¼ oz.; water, 1 pint; boil until solution is effected and make up with water to ¾ pint.

What chemical (insoluble in water) will dissolve glue and not injure its tenacity? A. We do not know of such a solvent.

How is the Chinese cement made? A. Shellac dissolved in enough alcohol or wood spirits (wood naphtha) to make a liquid of the consistence of molasses; or boil shellac, 4 parts; borax, 1 part; and a small quantity of water until dissolved, and concentrate the solution.

(4) J. W. asks if enameled tin vessels will resist the action of acid substances as effectually as glass or queensware. A. No; though some of these enamels resist dilute acids very well.

(5) D. T. E. asks for a recipe for making a first class article of violet copying ink? A. For blue violet, dissolve in 300 parts of boiling water methyl-violet 5B, Hofmann violet 3B, or gentiana violet B. For reddish violet, dissolve in a similar quantity of water methyl-violet BR. A small quantity of sugar added to these inks will improve the copying qualities. If the writing when dry retains a bronzy appearance more watermust be added.

(6) J. J. B. asks: What is the best trap for trapping drains, so as to prevent the entry of sewer gas into a dwelling house? A. Use two ordinary S traps in each pipe.

(7) W. H. K. asks: How much shrinkage in 50 gallons kerosene oil, 175° test, say in six months, when sealed? A. The only notable shrinkage liable to occur would be through loss by evaporation or leakage; the amount of such loss will depend upon the tightness of the package.

(8) J. F. B. asks: What is the mixture applied to fish lines to render them waterproof? A. Boiled oil, 2 parts; gold size, 1 part; beat together, with a little turpentine oil if necessary; apply with a piece of flannel, and expose to the air and dry.

(9) J. M.—The specimen you send is the pupa of a cat flea. The eggs of this insect are glued to the roots of the hairs of the cat, and hatch out in about four days. The white grub falls on the floor and crawls about the carpet, feeding on vegetable substances. In nine or ten days it assumes the pupa form, retaining this form about four days. In nine days more it becomes a perfect flea. Scotch snuff rubbed thoroughly into the fur of the cat is said to be an effectual remedy. Benzine will destroy the insect at the stage of specimen sent.

(10) W. Q. writes: In your "Notes and Queries" No. 11 (August 10, 1878) Inventor wants to know the best kind of wood for sound boards. You answer, spruce. I say if hemlock be tried it will be found far superior. [We are aware that hemlock answers admirably for sounding boards, but piano manufacturers prefer spruce.—ED.]

(11) S. W. D. writes: I have shells ⅛″ in diameter, ½″ long, closed at one end. What powder or mixture must they be filled with, leaving the one end open, to produce a report as loud or louder than a percussion cap if ignited at the open end? I have tried rifle powder, giant powder and others, but cannot get the required report. Please give me the exact proportions of the explosive material. A. If the explosive is not to be confined or tamped in the shell it will be necessary to employ a small quantity of something of the nature of silver fulminate, or potassium picrate, preferably added to flowered gunpowder, a mixture of potassium chlorate with a little sulphur, or a drop of collodion. The fulminate is prepared by adding to a hot solution of 40 grains of silver in ½ fluid oz. of nitric acid (specific gravity=1·37), 2 fluid ozs. of alcohol. Fumes of nitrous acid and ethyl nitrite are disengaged, and the fulminate separates on cooling, and is dried on bibulous paper in grain quantities over quicklime. To prepare the picrate add to a small quantity of water containing 13 grains of potassium hydrate, 50 grains of commercial picric acid, and after standing a short time collect and carefully dry the yellow picrate over caustic lime. As both of these bodies explode with extreme violence by heat friction or percussion it is necessary to handle them with precaution and in small quantities only.

(12) B. I. T. writes: I wish to know what substance to use in making sticky fly paper? A. Boiled linseed oil and rosin; melt and add honey. Soak the paper in strong solution of alum, and then dry before applying the above.

(13) C. F. W. asks if there is any way of removing the marks left on wall paper by the scratching of matches, an annoying habit of careless house servants. A. Generally, no.

(14) J. E. N. writes: A pump was put in a well 74 feet deep. The pump brass 3 inches in diameter with 10 inches stroke, 68 feet from the top of the well, with 1¼ inch gas pipe all the way. I claim that the pump will work easier with 1 inch discharge pipe and 1¼ inch suction. Am I right? A. We think not.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

R. W. S.—It consists largely of antimony.—J. H. P. It contains alumina, lime, silica, iron, and manganese oxide. Not merchantable.—J. L.—No. 1 (marl) is of fair quality. No. 2, less so. It would require a quantitative analysis to determine their precise market value. The soapstone is of little value for the purpose named.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

July 2, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Annunciator alarms, switch for, A. Gerard	205,540
Axle skein, G. Schreyer	205,689
Axle, wagon, P. R. Walsh	205,591
Bale tie, C. H. Victory (r)	8,314
Barber's appliance, J. P. Molitor	205,495
Basins, valve for, Hennessy & Dorgan	205,549
Bath attachment, Kuessner & Avril	205,490
Bedstead, invalid, Lovins & Gibson	205,659
Bee hive, J. R. Spearman	205,585
Belt fastener, Budlong & Talcott	205,610
Bending machine, metal, S. P. M. Tasker	205,588
Blind, Venetian, T. Simis	205,691
Bobbin winder, W. Duchemin	205,532
Boiler covering, A. Sweeney	205,587
Boilers, fire box for steam, S. Fox	205,625
Boot and shoe nailing machine, J. E. Kimball	205,652
Boot and shoe, rubber, S. E. Whittemore	205,711
Boot and shoe seams, rubbing, W. Manley	205,562
Boots and shoes, heel shave for, F. P. Warren	205,593
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Braid, star, A. Moll	205,567
Brake, car, H. H. Garrison	205,587
Brake, vehicle, C. T. Warren	205,707
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Brush blocks, machine for boring, A. Nawadny	205,497
Bucket, sap, A. E. Ware	205,592
Buckle, trace, E. G. Latta	205,715
Bung bush, G. H. Mixer	205,494
Burglar alarm, T. Powell	205,679
Burial casket, O. M. Johnston	205,555
Can, meat, F. Yunginger	205,714
Can, sheet metal, I. Porter	205,677
Can, sheet metal, R. Porter	205,676
Cans, refrigerating plug for, J. J. Johnson	205,486
Candlestick, W. Young	205,599
Cant dog, E. Broad	205,523
Car and coach-heater, railway, C. C. Newton	205,570
Car coupling, J. H. Gassaway	205,628
Car door, R. H. Coleman	205,477
Car heater, F. S. Bissell	205,468
Car propelling device, H. A. Kauflie	205,651
Car, ventilated grain, H. A. Gouge	205,634
Cars, draw bar for street, A. W. Eggleston	205,622
Cars, fender for street, Brisac & Barbe	205,471
Carboys, case for, J. H. Coleman	205,614
Carding machines, screen for, W. J. English (r)	8,313
Carpet fabric, H. Hardwick	205,638
Carpet fabric, B. Weiand	205,708
Castings, rumbler for cleaning, L. I. Todd (r)	8,310
Cement, E. Willis	205,598
Cement, hydraulic, Cummings & Bennett	205,616
Chain wheel, G. C. Tough	205,513
Check rower, A. R. Biddler	205,466
Chicken coop, G. H. Bronson	205,609
Churn, S. B. Donaldson	205,620
Churn attachment, reciprocating, S. D. Saxby	205,687
Churning apparatus, A. Beck	205,521
Cigar case, O. Hammerstein	205,482
Cigarette mouth piece, A. B. Citroen	205,475
Cloth stretching machine, G. D. King	205,489
Clothes drier, N. Scarritt	205,581
Coffee or nut roaster, W. E. Vernon	205,589
Coin tester, E. Lueders	205,492
Collar, H. O. Conaway	205,528
Compasses, T. H. Grigg	205,543
Corn, etc, drying, etc., Indian, Luckenbach *et al*	205,660
Corn cob splitter, J. F. Smith	205,693
Corset, skirt supporting, J. H. Foy	205,479
Cultivator, J. George	205,630
Cultivator and seeder, Morris & Austin	205,668
Cups, securing handles to tin, G. W. Knapp	205,653
Curtain fixture, J. K. Macfarlane	205,493
Dental pluggers, motor for, S. W. Dennis	205,619
Dental purposes, reducing metal for, N. B. Slayton	205,508
Dental tool, R. Arthur	205,462
Dog collar, M. Von Culin	205,515
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Dredging apparatus, hydraulic, E. Smith	205,584
Drills, feed attachment for guano, H. P. Nusbaum	205,671
Egg tester, F. B. Harris	205,547
Fare box, W. H. Hornum	205,646
Fence, barbed, E. Havenhill	205,639
Fence, barbed wire, A. J. Upham	205,703
Fence post, J. D. Romaine	205,685
Fence wire, barbed, O. Pederson	205,501
Fence wire, barbed, S. H. & J. M. St. John	205,697
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File guard, M. P. Ayres	205,519
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Fire escape, D. O Strifler	205,511
Fire extinguisher, H. S. Parmelee	205,672
Flour bolt, Cogswell & Finn	205,476
Flower stand, R. Murdock	205,670
Fly trap, A. G. Babcock	205,464
Fruit drier, McDowell & Ewell	205,662
Fruit drying house, W. H. Rogers	205,683
Garments, apparatus for cleaning, T. Patton	205,673
Gas regulator, Porter & Grimes	205,678
Gate, J. M. Mendenhall	205,565
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Governor for marine engines, G. Westinghouse, Jr.	205,710

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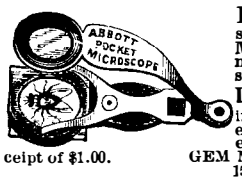

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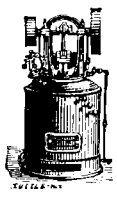

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Machinery of Every Description.
121 Chambers and 103 Reade Streets, New York.

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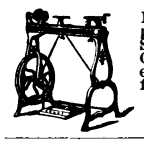

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95 & 97 Liberty St., New York.

Pond's Tools,

Engine Lathes, Planers, Drills, &c.
Send for Catalogue. DAVID W. POND, Successor to LUCIUS W. POND. **Worcester, Mass.**

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Moss' Process.
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A SUPERIOR SUBSTITUTE FOR WOOD-CUTS
AT MUCH LOWER PRICES.

Persons desiring illustrations for Books, Newspapers, Catalogues, Advertisements, or for any other purposes, can have their work done by us promptly and in the best style.

Our Relief Plates are engraved by photo-chemical means; are mounted on blocks type-high ready for use on any ordinary press, and will wear longer than the common stereotype plates.

They have a perfectly smooth printing surface, and the lines are *as deep, as even,* and *as sharp* as they could possibly be cut by hand.

Electrotypes may be made from them in the same manner as from wood-cuts.

Copy. The engraving is done either from prints or pen-drawings. Almost all kinds of prints can be re-engraved directly from the copy, provided they be in *clear, black lines* or stipple, and on *white* or only slightly tinted paper.

Pen drawings, suitable for engraving by us, must be made with *thoroughly* BLACK ink, on *smooth, white* paper. They should usually be made twice the length and twice the width of the plates desired.

When such drawings cannot be furnished us, we can produce them from photographs, pencil sketches, or designs of any kind accompanied with proper instructions. Photographs taken in the usual way, and of any convenient size, we can use.

Change of Size.—Wood-cut prints of the coarser kind may often be reduced to half their lineal dimensions, while others will admit of very little reduction, and some of none at all.

Most lithographic and steel-plate prints will admit of no reduction.

Very fine prints of any kind may be *enlarged* moderately without detriment.

Any prints which cannot be satisfactorily reduced or enlarged may be *redrawn* and thus brought to any desired size.

In all cases of reduction and enlargement, the relative proportions remain unchanged.

Proofs.—Whenever desired, we will furnish tintype proofs of the drawings made by us, for approval or correction, before engraving. A printed proof is furnished with each plate.

Time.—We cannot usually engage to fill an order for a single plate in less than from three to six days; larger orders will require longer time.

Estimates will be promptly furnished when desired. That these may be definite and correct, the copy to be used—whether print, photograph, sketch, or drawing—should always be submitted for our examination, together with a distinct statement of the size of plate wanted, and of any other details to be observed.

Terms.—To insure attention, all orders must be accompanied by an advance of half the price charged, the balance to be paid on delivery.

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References.—Our plates are now used by the principal publishers in this city, and by most of the leading houses in every State in the Union.

Send stamp for illustrated circular.

PROPOSALS FOR MAIL-LOCKS.

POST OFFICE DEPARTMENT,
WASHINGTON, D. C., August 15, 1878.

Separate sealed proposals will be received at this Department until 12 o'clock noon on the 20th day of March, 1879, for furnishing four new and different kinds of Locks and Keys for the sole and exclusive use of the United States mails, including, besides those to be used for mail bags, such as are to be used for the street letter-boxes of the United States.

As the public exposure and searching examination necessary to intelligent bidding on any prescribed model of a lock and key would tend to impair, if not entirely destroy, the further utility of all such locks and keys for the purposes of the mails, the Postmaster-General prescribes no models or samples for bidders, but relies for a selection on the mechanical ingenuity and skill which a fair competition among inventors, hereby invited, may develop in samples submitted by them.

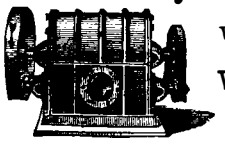
Specifications of requirements as to proposals, samples, kinds and quantities of locks and keys, contracts, etc., will be furnished on application by letter to the Second Assistant Postmaster-General.

No proposal will be considered which is not submitted in accordance with such specifications and forms of proposal.

The contracts which may be made are to be in conformity with the specifications and accepted proposals.

D. M. KEY,
Postmaster-General.

Baker Rotary Pressure Blower.



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Driven or Tube Wells

furnished to large consumers of Croton and Ridgewood Water. WM. D. ANDREWS & BRO., 414 Water St., N. Y., who control the patent for Green's American Driven Well

OLIVER'S SCREW-HEADED KEY.
Patented April 16th, 1878.
See SCIENTIFIC AMERICAN of 24th August, 1878.
This key can be extracted promptly, and with ease and certainty, from any wheel or pulley, no matter how tight it may have become seated. Apply for shop rights to PAUL A. OLIVER, Wilkesbarre, Luzerne Co., Penn.

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A NEW SIZE FOR PROSPECTING AND LABORATORY USE.
☞ ALL STONE CRUSHERS not made or licensed by us, containing vibratory convergent jaws actuated by a revolving shaft and fly-wheel, are infringements on our patent, and makers and users of such will be held accountable. Address
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N. B.—The suit against Imhaeuser & Co., of New York, was decided in my favor, June 10, 1874. A fine was assessed against them Nov. 11, 1876, for selling contrary to the order of the court. Persons buying or using clocks infringing on my patent will be dealt with according to law.

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New pattern. Increased percentage of power given. Estimates given on all kinds of Mill Machinery.
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Wood-Working Machinery,

Such as Woodworth Planing, Tonguing, and Grooving Machines, Daniel's Planers, Richardson's Patent Improved Tenon Machines, Mortising, Moulding, and Re-Saw Machines, and Wood-Working Machinery generally. Manufactured by
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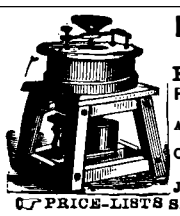

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J. R. Stewart, *Pres.* W. R. Dunlap, *Sec.*
☞ PRICE-LISTS SENT ON APPLICATION.

PROPOSALS FOR IMPROVEMENTS IN MAIL-BAGS AND MAIL-BAG TAGS.

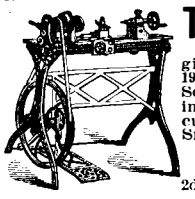
POST OFFICE DEPARTMENT,
WASHINGTON, D. C., August 15, 1878.

Proposals from patentees or their assignees, for granting the use of improvements in the construction or in the mode of opening and closing mail-bags, of any or all kinds, and in the manufacture or materials thereof, and also for the use of patented devices for tagging or labeling the same, will be received at this Department until 12 o'clock noon on the 2d day of December, 1878.

All proposals must be in accordance with the specifications and form of proposal which will be furnished on application by letter to the Second Assistant Postmaster-General.

The contracts which may be made for the use of any patents will be in conformity with such specifications and the accepted proposals.

D. M. KEY,
Postmaster-General.



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Furnishes steam power for all *Agricultural* purposes, *Driving Saw Mills*, and for every use where a first-class and economical Engine is required. Eleven first-class premiums awarded, including Centennial, '76. Refer to No. 7, issue of '77, No. 14, issue of '78, of SCIENTIFIC AMERICAN, for Editorial illustrations.

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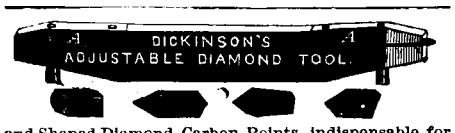

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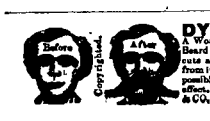

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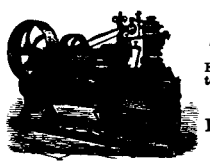

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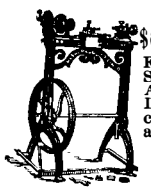

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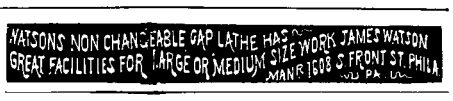
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GASKETS, RINGS, &c., &c., including all kinds of Rubber Goods for Mechanical and Manufacturing uses. Our goods are warranted in all cases.
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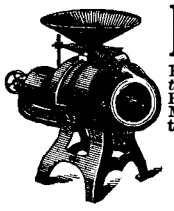

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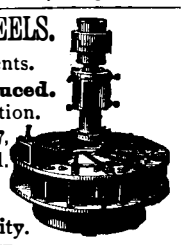

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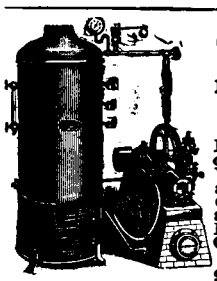

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